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ABSTRACT

Designed to help the classroom teacher choose materials and activities for students in implementing computer literacy, this guide provides a complete statement of behavioral objectives for the program in a taxonomy of objectives, and performance expectations are specified to provide both standards and evaluation guidelines. The grade level entry point for content needed to meet performance expectations is identified in a scope and sequence chart, which also indicates the modes of instruction for the concepts or skills. These instructional modes categorize the computer as either a tutor, tutee, tool, or topic. An activities chart, which lists general activities for each of the taxonomy's performance expectations by grade levels, is followed by lesson plans and materials for 18 suggested sample activities for the various grade levels. A list of the software, printed materials, and audiovisuals referenced in the activities is provided. Appendices include an exploratory computer literacy framework that was used as a model for the taxonomy, glossaries of acronyms and terms, and lists of recommended software, periodicals, and books. (LMM)

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EXPLORATORY COMPUTER LITERACY CURRICULUM GUIDE, GRADES K-6

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FOREWORD

Computer applications are increasing in research, business, and industry to the point where their effects impact almost daily on the lives of people. More recent advances have drastically reduced costs to make the computer available for use in small businesses, recreation, and even the home. This guide is an effort to provide direction for a computer literacy program in which all students in Grades K-6 can gain experiences to meet the requirements needed to understand and utilize computerized equipment and technology.

The guide is designed to help the classroom teacher choose materials and activities for students in implementing computer literacy. The Exploratory Computer Literacy Curriculum Guide is offered in the beginning stages of Computer Literacy and thus will undergo periodic revision. Because of the dynamic nature of computer technology and computer education, users must remain alert to evolving trends both locally and nationally. The Bibliography appearing in Appendix E provides sources of further information.

We hope that all elementary teachers and principals will find this guide useful for initiating and directing computer literacy programs in their classrooms and schools.

Francis M. Hatanaka, Acting Superintendent

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Introduction

Computer Literacy brings a new challenge to the schools of Hawaii because it involves the study of an emerging technology. This guide is designed to offer direction for teachers and administrators in the development of a computer literacy program for grades K through 6. The literacy program outlined will provide a foundation on which schools can design a program for student development of an understanding and appreciation of computers in our society.

The intent of the exploratory component of computer literacy is to develop an awareness, appreciation, and understanding of the functions and impact of computers in daily life. This component is a thematic area of the curriculum in that its instruction is delivered through more than one subject. Instructional areas addressed in the Activities Chart are career education, language arts, mathematics, social studies, and science.

The foundation work for the exploratory component of computer literacy was undertaken by an advisory group of teachers and educational specialists from local schools and colleges who defined the rationale, goals, and objectives of the program in the Computer Literacy Framework (Exploratory Component), which is the basis for this guide. The framework provides the curricular goals, objectives, and benchmark performance expectations for Grades 3, 6, 8 and 12 used to formulate this K-6 guide. A secondary guide has also been developed for grades seven through twelve. Therefore, students will be able to continue their computer literacy awareness in the secondary schools.

Computer Literacy Components

There are three components of Hawaii's Computer Literacy Program: an exploratory component, a computer science component and a vocational-technical component. The computer science and vocational-technical components are intended for secondary school use only, while the exploratory component is to be used at both elementary and secondary levels. This guide deals with the exploratory component of Computer Literacy for grades K-6.

The exploratory component of Computer Literacy aims to develop computer literate students who can function in a society where contact with computers is becoming a daily necessity. For purposes of setting educational standards, students who are computer literate are those who have an awareness, appreciation and understanding of the functions of computers and their impact on daily life; feel confident in using computers; have a knowledge of how computers can be used as a tool for problem solving and decision making; recognize the limitations as well as the usefulness of computers in advancing human welfare; and recognize the educational and career opportunities related to the specific and general uses of the computer.

Thematic Nature of the Exploratory Component

The exploratory component of Computer Literacy is a thematic area of the curriculum. Thematic areas embrace subject matter that is appropriately embedded in more than one of the existing subjects of the school. For example, Computer Literacy is embedded in traditional mathematics, science, social studies, vocational education and language arts. It is also embedded in other thematic areas; for example, career education and environmental education. Computer Literacy will be taught as a subcomponent of these subjects and will gain its identity through study of computer use in the knowledge arena of these subjects.

Foundations of the Guide

The exploratory component of Computer Literacy introduces computers into the school curriculum with minimum disruption of current programs. Computer Literacy was pioneered by groups such as Minnesota Educational Computing Consortium and the Department of Computer Science, California State University at Chico. The National Council of Teachers of Mathematics was also instrumental in raising the awareness of the nation's schools for the need to introduce Computer Literacy into the school curriculum through its paper, Agenda for Action, Recommendations for School Mathematics of the 1980's. In this paper, the Council takes the strong stand that mathematics programs should "take full advantage of the power of calculators and computers at all grade levels..." It goes on to say, "A computer literacy course, familiarizing the student with the role and viewpoint of the computer, should be part of the general education of every student."

In 1980, planning was begun in Hawaii to prepare for the inclusion of Computer Literacy in the curriculum. Because of its thematic nature, the program dictated that specialists from most of the major subject matter areas provide input into the State Plan. Educational specialists and teachers from elementary, high school and colleges in the private and public sectors were drawn together as an advisory group. Their charge was to formulate a

framework for the Exploratory Component of Computer Literacy for grades K-12. This Computer Literacy Framework, hereafter called Framework, provides the foundation for the present guide.

The Computer Literacy Framework (see Appendix A)

The Framework identifies the curricular objectives and the benchmark performance expectations related to the State Plan for Computers in Education. It provides the basic structure for the exploratory component of Computer Literacy. The benchmark performance expectations are statements of competence that students are expected to attain at various benchmarks - in grades 3, 6, 8 and 12. They are written in the form of demonstrable behavior that requires an application of knowledge, skills or attitudes.

The Guide Rationale

The teacher who incorporates Computer Literacy into the classroom will gain a new set of instructional alternatives. The computer can be a patient non-judgmental tutor for the slower student and a quick-responding, multi-faceted problem solver for the exceptional student. It can be used as an incentive, a diversion, an aid and a source of instruction.

This guide attempts to give teachers direction so that the computer is not used in only one category. There are performance expectations that require skill and knowledge so that the computer will not be relegated to being just a toy. And there are performance expectations that call for positive attitudes and experimentation so that the computer will not be turned into an unrelenting drillmaster. The guide gives direction while giving enough latitude for exploration, experimentation and individual growth.

Several questions must be addressed for the classroom implementation of computer literacy: (1) Where in the curriculum will this new program be placed? (2) Which instructional modes will be involved? (3) What teaching methodology will be used?

Curriculum Relationships

Because of the thematic nature of Computer Literacy, the elementary component is lodged in both its own curriculum space as well as that of existing instructional areas... principally mathematics, science, social science, language arts and career education.

Mathematics. The Mathematics Program Guide includes "understanding the uses and limitations of modern technological advances such as computerization," in the commentary on the second of its four goals. Goal 2 reads: "Develop understanding of the importance and relevance of mathematics historically and in the world today."

The concept of computer literacy is further endorsed in the statement of Ten Basic Skill Areas appended to the Mathematics Program Guide.

Computer Literacy has been a concern of the mathematics community for many years. The computer is a major tool of today's mathematician, and mathematicians have contributed to each step of its evolution. Therefore it is not surprising that computer programs for the delivery of each of the major topics of the mathematics guide (numbers, operations, geometry, measurement and problem solving) are available in computer software or can, with little effort, be put into a computer delivery format.

For the teacher looking to incorporate the user component of computer literacy into the classroom, mathematics provides many opportunities and is heavily drawn upon in this guide.

Science. The Elementary Science Curriculum Guide incorporates a variety of statements in its goal and objectives structure that support the intent of computer literacy. The one most encompassing objective reads:

> "Facilitate the students ability to use scientific knowledge, processes, instruments and language to clarify values, examine issues, solve problems in fulfilling personal, social and career life roles."

Within the scientific community the computer has become an essential tool in data analysis and hypothesis and model generation since the 1950's. It has become so versatile that applications are found in almost every modern scientific laboratory. As a tool, the computer functions to enhance the basic informational processing capacity of the scientist. In keeping with this

trend throughout the Science Curriculum Guide, the process skills of science are emphasized. These skills are:

observing
classifying
measuring
using space-time relationships
collecting and analyzing data
graphing
inferring and predicting
model building
using equipment
using scientific vocabulary
communicating
thinking

Software has been or can be readily generated to facilitate development of these skills.

Language Arts. Computer applications in word processing and information storage have created a revolution in business and industry that is now spilling over into the operation and management of the home. More and more students come from homes where a computer is as much a part of the furniture as is the radio, TV, telephone and electric lamp. More and more students are coming to school with assignments composed at the computer keyboard.

Computers have long since invaded the realm of literature. The science fiction/futuristic literature is filled with computer references and this literature is a natural source of valuable commentary on the power and limitations of computers.

Social Science. Computers are as much a tool of the social scientist as the physical or biological scientist. Wherever collection, storage, retrieval or analytical processing of large amounts of information is necessary, the computer is being used.

Computers are having, and will have, more powerful effects on society and individuals than anyone can imagine or predict. Our hope for making wise and beneficial use of technology and avoiding some of the potential disasters is to have an educated citizenry with an attitude of responsibility and a sense of control. Thus the impact of computer technology on society is a continuing topic of study and conjecture by the social science community.

Career Education. Since work with computers in one form or another is now part of the job requirement for much of the nation's work force, it is obvious that the career education programs must incorporate such information. Materials exist in this area and are being regularly updated.

Instructional Modes

It is recognized that students will gain knowledge of computers through several modes or methods of instruction. Four categories of instructional

modes will be used in the classroom. Three involve use of computers. The four categories are:

- the computer as a tutor,
- the computer as a tutee,
- the computer as a tool,
- the computer as a topic.

The computer as a tutor includes methods of instruction which use the computer to guide a student through a lesson. These include:

- Drill and practice
- Games and Simulation
- Testing and Response
- Tutorial Instruction

The computer as a tutee includes methods of instruction using computer programming situations wherein the computer is instructed by the students in how to perform. These include:

- Programming
- Flowcharting
- Algorithm Construction
- Problem Solving

The computer as a tool includes methods of using the computer to provide a service to the student. It acts as an instructional aid. Many of these are teacher management uses from which the students receive direct output. In others, students use the computer as a simple processing device as they would a calculator or a typewriter. These modes include:

- Test Scoring
- Attendance
- Curriculum Material Generation
- Grade Keeping
- Material Management
- Communications
- Data Processing
- Word Processing

The computer as a topic deals with instruction in the mechanics of computers and how computers function and impact on arenas of science, technology and education as well as daily life. These facets include studies of the:

- Structure and functions of computers as machines
- History of the computer
- Career opportunities in computers
- Social impact of the computer
- Value of the computer to self and society
- Uses of the computer in society.

Use of Instructional Modes

To meet the Computer Literacy performance expectations, these various instructional modes will be used. Under some circumstances only one particular kind of instructional mode will be needed to ensure that an expectation will be met. For example, to meet the third grade expectation, "The student identifies the input and output units," it will be necessary to have some instruction about the "structure and function of computers as machines." It will require that the computer be a topic of study.

Under other circumstances there will be several modes of instruction available to meet the expectation. For example, to meet the 6th grade expectation, "The student experiments with programs as a user," there are three modes of instruction available. The student can experiment with programs delivered by a tutor model, a tutee mode or a tool mode. The teacher may use any or all of the modes of instruction to provide the student with the learning experience necessary to satisfy the expectation.

Installation of the Computer Literacy Program

How a program of Computer Literacy is installed in a classroom is mainly determined by the amount of access to computers and software. Three situations will be faced by schools and teachers installing a literacy program. Situation 1, no computer is available; Situation 2, there is limited access to computers; Situation 3, there is unlimited access to computers. In all probability most teachers wishing to install a computer literacy program will have a topic with Situation 2.

Situation 1 - no computer available. The teacher facing a situation where no computer can be used with children can still teach certain elements of the literacy program. In this case, the computer can be studied as a topic. A schematic showing the performance objectives is found in the Scope and Sequence Chart. Materials in the form of books and audio-visuals do exist to support such studies. Further, activities which require no computer and still allow for the meeting of all but those objectives explicitly tied to computer use are suggested in the Activities Chart.

The user of this guide, however, should note that a program with no computer access is most extensively supported with materials appropriate for grade 3 and above. This should not prevent kindergarten and primary teachers from introducing certain computer concepts.

Situation 2 - limited availability of computer. Most teachers will find themselves in Situation 2. Because computer availability will differ from school to school, a determination will have to be made as to how much actual time a student can interact with the computer.

Whatever the case may be, it is suggested that the teacher honor the thematic nature of computer literacy and teach the program wherever possible in the context of the existing instructional areas. Such programs will place the utility nature of the computer in proper perspective. The student should always see the computer as a tool that they can use in their everyday life.

Situation 3 - unlimited use of computers. When the school program shifts heavily into computer-based education, an area of concern is the assurance that the computer is adequately dealt with as a topic of study. Many of the performance expectations of the Taxonomy are intuitively explored through involvement with the computer. However, a fuller cognitive understanding will develop only when the student conceptualizes operations, interactions, functions, etc., in the context of the study of the nature and impact of the computer.

Curriculum Guidelines

The guidelines for the development of the content of Computer Literacy are included in the following sections: The Taxonomy of Objectives which provides a complete statement of the objectives of the Computer Literacy program; The Performance Expectations for Computer Literacy which provide the behavioral standards for the program; The Scope and Sequence Chart which identifies the grade level entry point for content to meet performance expectations; The Modes of Instruction which describes how the Computer Literacy program can be delivered; and The Activities Chart which lists activities that will help to meet Performance Expectations.

The Activities Chart will probably be the most used section of this Guide. The following descriptions of the Taxonomy, Performance Expectations and the Scope and Sequence Chart are important for the understanding of the Activities Chart.

The Taxonomy of Objectives

The Taxonomy of Objectives was derived from the Computer Literacy Framework. (See Appendix A.)

The Taxonomy which is an analytical outline of the Framework has these design features:

1. Goals are listed and broken into primary objectives which are reduced to performance expectations.

2. Objectives are phrased so that they can be used to identify relevant classroom materials.

3. The numerical identification system is designed to accept expansion or contraction of goals and objectives as experience requires.

The numeric system of the Taxonomy consists of one-, two- and three-digit numbers each separated by decimal points. The first digit always stands for the general goals whether it stands by itself or in a two- or three-digit number. Likewise, the second digit always stands for the objectives and the third digit stands for the performance expectations.

The coding of the Taxonomy can be expanded by adding numbers at the appropriate decimal position. For example, there are presently 5 goals covered in the K-6 Framework. If it was necessary to add a sixth goal it could easily be inserted by adding another section that would start with the number six, listing the objectives and expectations below in the prescribed decimal position. Deletions can be made by dropping any goal, objective or expectation that is no longer needed. If an entry is deleted, all subordinate entries must be deleted and the numbering of non-subordinate entries adjusted.

Use of the Taxonomy's numeric system is found in all the instruments to give a common basis for identification of literacy components. It is used in the Performance Expectations Chart, the Activities Chart and the Score and Sequence Chart.

Taxonomy for Computer Literacy Framework

GOALS: The student will feel confident about using computers.

The student will know how the computer can be used as a tool for problem-solving and decision-making

The student will be aware of, appreciate and understand the functions and impact of computers in daily life.

The student will recognize the limitations as well as the usefulness of computer (science) technology in advancing human welfare.

The student will recognize educational and career opportunities related to the specific and general uses (applications) of computers.

1. The student will feel confident about using computers. (Demonstration of confidence implies ability to use the computer.)

1.1. Interact with a prepackaged computer program.

1.1.1. The student recognizes that a computer needs instructions to operate.

1.1.2. The student reads computer instructions, keyboard and output.

1.1.3. The student uses basic control keys and commands.

1.1.4. The student selects and uses appropriate written resources (e.g., handouts, manuals) for operating the computer.

1.1.5. The student experiments with programs as a user.

1.1.6. The student takes appropriate action in response to error messages in using prepackaged programs.

1.2. Identify the need for information to be processed according to a set of predefined computer rules: organized, coded, given meaning and transmitted.

1.2.1. The student gives reasons for processing information.

1.2.2. The student identifies the structural components of information processing, e.g., organizing, coding, processing and reporting.

1.2.3. The student sequences the steps required in a process.

1.2.4. The student recognizes that computers process information by searching, sorting, deleting, updating, summarizing, storing, etc.

1.3. Given a simple algorithm/flowchart explain what it accomplishes, i.e., interpret, generalize, and discuss applications.

1.3.1. The student interprets a simple algorithm/flowchart.

1.3.2. The student generalizes how an algorithm/flowchart is used.

1.3.3. The student discusses the applications of algorithms/flowcharts.

1.4. Identify the fact that we communicate with computers through specific symbols and words.

1.4.1. The student recognizes that programming languages are used to give the computer instructions.

1.4.2. The student recognizes words or symbols that operate the computer.

1.5. Develop positive attitudes and behaviors toward computers.

1.5.1. The student demonstrates positive behaviors and attitudes towards computers by seeking work or play with computers.

1.5.2. The student demonstrates positive behaviors and attitudes toward computers by describing past experiences with computers with positive affect words like fun, challenging, etc.

2. The student will know how the computer can be used as a tool for problem solving and decision making.

2.1. Uses computerized information systems (computer or computer system) to solve simple problems and make decisions.

2.1.1. The student uses the computer to assist in decision making.

2.1.2. The student translates a simple algorithm/flowchart into a program.

2.1.3. The student develops an algorithm for solving a specific problem and/or to solve a set of similar problems.

2.1.4. The student describes how computers can assist in problem solving and decision making.

3. The student will be aware of, appreciate and understand the functions and impact of computers in daily life.

3.1. Identification and description of basic operations of computer systems including identification of input, memory, control, arithmetic and output components.

3.1.1. The student identifies the Input/Output peripherals.

3.1.2. The student describes the functions of the Input/Output and Processing (control, memory, arithmetic/logic) components.

3.2. Recognition of data processing, process control, and information storage and retrieval applications in business and industry, government, education, health and social services, recreation, creative arts, etc.

3.2.1. The student identifies computer applications in business and industry, government, education, health and social services, recreation, creative arts, etc.

3.3. Recognition of how computers affect employment, public surveillance, privacy of individuals, progress and culture, personalization/impersonalization, regulatory and enforcement functions, and daily relationships with people, agencies, organizations, etc.

3.3.1. The student values efficient information processing.

3.3.2. The student understands the advantages and disadvantages of routine tasks.

3.3.3. The student appreciates the economic benefits of computerization for society.

3.3.4. The student values increased communication and availability of information made possible through computer use.

3.3.5. The student understands that computers can be used to effect distribution and use of economic and political power, in criminal and other anti-social activities, to change society in undesirable ways.

3.3.6. The student identifies applications of computer science and technology in medicine, law enforcement, education, engineering, business, transportation, military, recreation, government, library, and creative arts.

3.4. Recognition that technology differs from science in that the aim of technology involves the means of building and doing useful things while the aim of science is the development of knowledge and understanding.

3.4.1. The student knows how electronic technology evolved.

4. The student will recognize the limitations as well as the usefulness of computer (science) technology in advancing human welfare.

4.1. Recognize disadvantages of computers as tools, dependency, limitations, cost, etc.

4.1.1. The student lists at least three limitations of computers in the advancement of human welfare.

4.2. Identify major applications of computers for information storage and retrieval, simulation and modeling, quality or process control, and decision making and problem solving.

4.2.1. The student describes how computers assist people in advancing human welfare.

5. The student will recognize the educational and career opportunities related to the specific and general(application) of computers.

5.1. Recognizes careers in Support Services (e.g., data entry, word processing, computer operations personnel), Technical Services (e.g., programmer, analyst, data processor, equipment maintenance and repair personnel), Scientific Personnel (e.g., computer scientist, electrical engineer, computer engineer) in the community that involve computers.

5.1.1. The student identifies support service, technical and scientific careers in the community that involve computers.

5.1.2. The student identifies national and international careers that involve computers.

5.2. Recognize career opportunities related to the specific and general opportunities of the computer integrated with other careers.

5.2.1. The student compares educational requirements and opportunities for careers that involve computers.

Performance Expectations

To set standards and provide evaluation guidelines, a set of benchmark expectations have been written into the Computer Literacy Framework.

The performance expectations are written in a form which calls for conduct that can be validated and which assumes the application of knowledge, skills and attitudes. These expectations provided the basis for developing the activities outlined in the guide. A list of the performance expectations is found in the chart on the following page and is also a part of the original framework. (Appendix A)

Although this guide is limited to grades K-6, the Framework encompasses grades K-12. Much of the more advanced content introduced in the K-6 curriculum is reinforced in the 7-12 curriculum.

COMPUTER LITERACY GUIDE

Performance Expectations Chart

Kindergarten

- 1.1.1. The student identifies the input and outnut units. (Gr. 3 Exp)
- 1.1.1. The Student recognizes that a computer needs instructions to operate. (Gr. 3 Exp.)
- 1.1.3. The student uses basic control keys and commands. (Gr. 3 Exp)
- 1.1.5. The student experiments as a user. (Gr. 6 Exp.)
- 1.5.1.-2. The student demonstrates positive attitudes and behaviors toward computers. (Gr. 6 Exp)

Grade 1

- 1.1.2. The student reads instructions, the keyboard and output. (Gr. 3 Exp.)
- 1.1.6. The student takes appropriate action in response to error messages in using prepackaged programs. (Gr. 6 Exp.)

Grade 2

- 1.4.2. The student recognizes words and symbols that operate the computer. (Gr. 3 Exp)
- 3.2.1. The student identifies computer applications in business and industry, government, education, health and social services, recreation, creative arts, etc. (Gr. 6 Exp)
- 5.1.1. The student identifies support service, technical and scientific careers in the community that involve computers. (Gr. 3 Exp)

Grade 3

- 3.1.2. The student describes the functions of the input, output and processing components. (Gr. 6 Exp.)
- 1.2.1. The student gives reasons for processing information. (Gr. 6 Exp.)

Grade 4

- 1.1.4. The student selects and uses appropriate resources (manuals) for operating the computer. (Gr. 6 Exp.)
- 1.4.1. The student recognizes that programming languages are used to give instructions to the computer. (Gr. 8 Exp)
- 1.3.1.-3. The student interprets, generalizes and discusses applications of a single algorithm/flowchart. (Gr. 8 Exp)
- 5.1.2. The student identifies national and international careers that involve computers. (Gr. 6 Exp)

Grade 5

- 1.2.2. The student determines the structural components of information processing. (Gr. 6 Exp.)
- 1.2.3. The student sequences the steps required in a process. (Gr. 6 Exp.)
- 1.2.4. The student recognizes that computers process information by searching, sorting, deleting, updating, summarizing, storing, etc. (Gr. 12 Exp.)
- 2.1.2. The student translates a simple algorithm/flowchart into a program. (Gr. 8 Exp)
- 2.1.3. The student develops an algorithm for solving a specific problem and/or solving a set of similar problems. (Gr. 12 Exp)
- 3.3.4. The student values increased communication and availability of information made possible through computer use. (Gr. 6 Exp)

Grade 6

- 4.1.1. The student lists at least three limitations of computers. (Gr. 8 Exp)
- 3.4.1. The student knows how electronic technology evolved.
- 2.1.4. The student describes how computers can assist in problem solving and decision making. (Gr. 12 Exp)
- 4.2.1. The student describes how computers assist people. (Gr. 8 Exp)
- 5.2.1. The student compares educational requirements and opportunities for careers that involve computers. (Gr. 8 Exp.)

*Benchmarks at which Performance Expectations are to be met.

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Sccpe and Sequence

The Scope and Sequence Chart brings together three important pieces of information and shows the inter-relationships among them. It condenses the taxonomy into short essential phrases. It shows the point at which performance expectations are introduced, tested and reinforced, and indicates which modes of instruction will be used to teach the skills and/or concepts embedded in the performance expectations. The numeric system of the taxonomy is listed on the left of the Scope and Sequence Chart. The one-digit numbers are the general goals and the two-digit numbers are the primary objectives. Each performance expectation is indicated by a three-digit number and is identified with the grade level in which activities leading to its achievement is introduced. Introduction is shown in light shading. Dark shading begins with the grade at which the benchmark expectations are met. Continuance of the dark shading in the grades beyond shows a reinforcement of concepts and/or skills.

SCOPE AND SEQUENCE CHART

Computer as a topic - C
Computer as a tutee - E
Computer as a tutor - R
Computer as a tool - L

	K	1	2	3	4	5	6
1. Confidence about Computer Use							
1.1. Interacts with computer							
1.1.1. recognizes computer instructions	R	R	ER				
1.1.2. reads instructions, keyboard, output		R	ER				
1.1.3. uses control keys/commands	R	R	ER				
1.1.4. selects/uses written resources							
1.1.5. experiments as a user	R	R	R				
1.1.6. responds to error messages		R	ER				
1.2. Identifies Computer Rules							
1.2.1. rationalizes information processing				C	C	C	
1.2.2. determines structural components						C	
1.2.3. sequences process steps						C	
1.2.4. recognizes computer processes						C	
1.3. Explains Algorithm/Flowchart							
1.3.1. interprets					C	C	C
1.3.2. generalizes uses							C
1.3.3. discusses applications							C
1.4. Identifies methods of communication w/computer							
1.4.1. recognizes programming languages					CE	CER	CER
1.4.2. operates with words/symbols			CE	CER	CER	CER	CER
1.5. Develops Positive Attitudes/Behaviors							
1.5.1. seeks work/play with computer	R	R	ER	CER	CERL	CERL	CERL
1.5.2. uses positive affect words	R	R	ER	CER	CERL	CERL	

Computer as a topic - C
Computer as a tutee - E
Computer as a tutor - R
Computer as a tool - L

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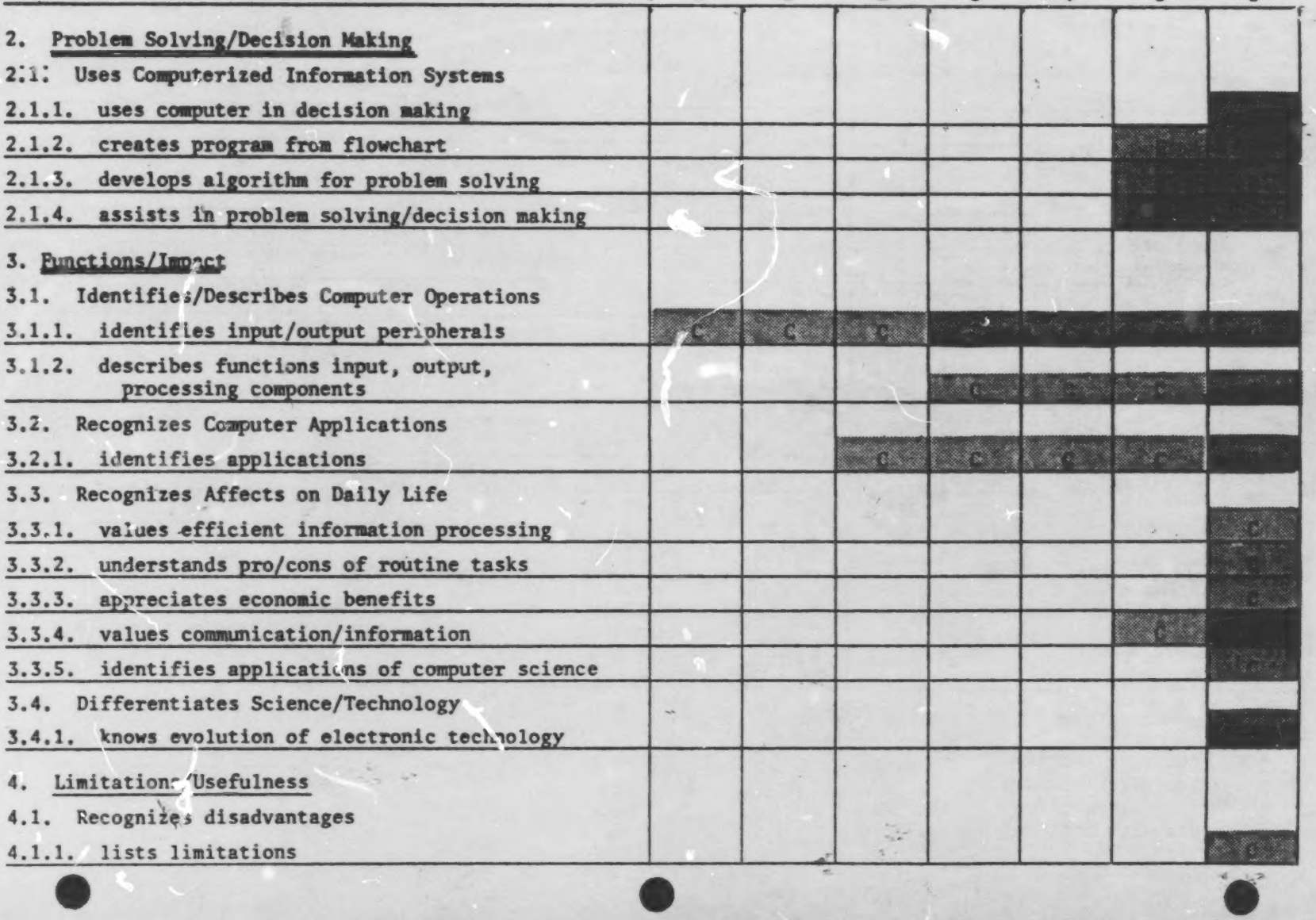

Computer as a topic - C
Computer as a tutee - E
Computer as a tutor - R
Computer as a tool - L

SCOPE AND SEQUENCE
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	K	1	2	3	4	5	6
4.2. Identifies Major Applications							
4.2.1. describes how computers assist people							■
5. Education/Career Opportunities							
5.1. Recognizes Support/Technical/Scientific/ Integrated Fields Careers							
5.1.1. identifies local services/personnel			■	■	■	■	■
5.1.2. identifies national/international careers					■	■	■
5.1.3. compares educational requirements/opportunities							■

■ Concept, skill introduced
■ Concept, skill expectation reached and reinforced

Modes of Instruction

The letters within the shaded areas stand for the mode or method of instruction that will be used to teach the concept or skill. The "C" stands for the computer as a topic", the "E" stands for "the computer as a tutee", the "R" stands for "the computer as a tutor", and the "L" stands for "the computer as a tool". (The last letter of each phrase was used.)

"C" ... "The computer as a topic" is a term describing the study of computers as devices and their meaning to society. Content is present through audio-visual aids, printed materials, field trips and lessons that do not need a computer to teach the concepts.

"E" ... "The computer as a tutee" is a term used to show that the computer is accepting instruction from the student. This is usually the case when the student is programming the computer.

"R" ... "The computer as a tutor" is a term used to show that the computer is the instructor and giving directions to the student. This is the case when the student is using the computer for drill and practice, simulation, etc.

"L" ... "The computer as a tool" is a term used to show that the computer is being used as an aid in the classroom. This is the case when the computer is used for listing grades or generating a test.

The Activities Chart

The Activities Chart lists general activities for each of the performance expectations of the Taxonomy by grade levels. In the left-hand column are the taxonomic numbers and descriptions of the goal, primary objective and performance expectations.

Under this are listed activities that will help achieve these performance expectations. If a performance expectation is to be met at the grade level, it is noted as that grade level benchmark (e.g., Grade 3 Benchmark).

The next five columns under "Instructional Areas" list the subject matter areas: CA stands for Career Education, LA stands for Language arts, MA stands for Mathematics, SI stands for Science and SS stands for Social Science. If a letter is put into one of these columns it shows that this actively satisfies the instructional needs of that subject. Usually more than one column is marked. This means that the activity satisfied the instructional needs of each of subject marked. The letters (C,E,R,L) appearing in the column identify the modes or methods of instruction that can be used in delivering the activities.

A Suggested Sample Activities Section follows the activities chart. Included in this section are sample activities from which classroom teachers can select. Also included are sample software and support materials that can be incorporated into the lessons.

ACTIVITIES CHART
KINDERGARTEN

GRADE K	INSTRUCTIONAL AREAS				
	CA	LA	MA	SI	SS
1. Feel confident about computer use.					
1.1. Interact with computer.					
1.1.1. Recognize computer instructions.			R	R	
Use computer program with graphic or audio instructions. Show students operating procedures and have them respond by working at computer. Appropriate content: whole numbers, measurement, geometric shapes, weather, letter recognition, musical note recognition found in tutorial programs.					
1.1.3. Use control keys/commands.			R	R	
Use a computer program with graphic or audio instructions. Show students operating procedures and have them respond by operating computer using control keys and commands. Appropriate content: whole numbers, measurements, geometric shapes, typewriting, letter recognition, musical note recognition found in tutorial programs.					
1.1.5. Experiment as a user.			R	R	
Use a computer program with graphic or audio instructions. After students have shown ability to operate, allow them to experiment with the graphics. Appropriate content: whole numbers, geometric shapes, recording weather, music, typewriting found in tutorial programs.					
1.5.1. Seek work/play with computers.			R	R	
Use a computer program with graphic or audio instructions in a game format. Create a computer interest center.					

ACTIVITIES CHART
KINDERGARTEN

GRADE K	INSTRUCTIONAL AREAS				
	CA	LA	MA	SI	SS
1.5.1. con't. Allow students access as they show interest. Appropriate content: whole numbers, measurement, geometric shapes, music, word games, riddles, color discrimination, and rhymes found in tutorial programs, and simple computer games.					
1.5.2. Use positive affect words.			R	R	
Elicit student feelings about operating computers. Defuse negative experiences by providing adequate computer interaction time, individual, group or teacher supported experience at computer as needed.					
Provide interaction with programs that student identifies as fun.					
3. Know computer functions/impact.					
3.1. Identify and describes computer operations.					
3.1.1. Identify input/output peripherals.			C	C	
Identify the components of the computer students will be using. Include: keyboard, screen, tape recorder or disk drive, and printer. Give these names for quick communication.					

ACTIVITIES CHART
GRADE 1

GRADE 1	INSTRUCTIONAL AREAS CA	LA	MA	SI	SS
1. Feel confident about computer use.					
1.1. Interact with computers.					
1.1.1. Recognize computer instruction.			R	R	
Use computer programs with graphic or audio and/or alpha-numeric instructions. Demonstrate or have students work through self instructional formats to gain capacity to use the computer. Discuss the fact that the students are (telling) instructing the computer in what to do - to turn on, to display a menu, to run a program, and to display student responses.					
Note: computers are much like students, tell them what to do, and if they are able to do what they are told, they do it. Appropriate content: whole numbers, measurement, geometric shapes, weather, discrimination of sounds, spelling patterns, musical note discrimination and games.					
1.1.2. Read instructions, keyboard, and output.			R	R	
Use computer programs with alpha-numeric instructions. Demonstrate or have students work through self instructional formats to gain capacity to use program. Have students read and respond to instructions in program. Using keyboard, have students read and respond to alpha-numeric output on screen or printer. Appropriate content: whole numbers, measurement, geometric shapes, typewriting, letter discrimination, weather, spelling patterns, alphabetizing, and games.					

ACTIVITIES CHART
GRADE 1

GRADE 1	INSTRUCTIONAL AREAS				
	CA	LA	MA	SI	SS
1.1.3. Use control keys/commands.			R	R	
Use computer programs operating out of standard control keys (off/on, input, +, -, print, etc). Present incrementally, adding one or two keys with each program as mastery is evidenced. Appropriate content: whole numbers, measurement, geometric shapes, phonetics and typewriting.					
1.1.5. Experiment as a user.			R	R	
Use open-ended computer program which allows students to generate own responses. Provide opportunity to operate computers individually or in small groups. Appropriate content: whole numbers, measurement, geometric shapes, rhymes, word groupings, animal discrimination and games.					
1.1.6. Respond to error messages.			R	R	
Use prepackaged program that is delivered in a tutor mode.					
Show students error messages and how to respond. Have students practice response to error message. Appropriate content: whole numbers, measurement, geometric shapes, riddles, phonics, word recognition, and opposites.					
1.5. Develop positive attitude/behavior.					
1.5.1. Seek work/play with computer.					
Use computer programs that advance the general instructional needs of the class and programs that permit play.					

ACTIVITIES CHART
GRADE 1

GRADE 1	INSTRUCTIONAL AREAS				
	CA	LA	MA	SI	SS
1.5.1. con't. Allow for independent or small groups use of programs. Safeguard equipment by a conscious regimen of careful handling and storage of equipment and materials. Appropriate content: measurement, mathematics, music, games and rhymes.					
1.5.2. Use positive affect words.			C	C	
Provide an opportunity for students to discuss their experience with the computer. Identify areas of concern and provide ameliorating experiences.					
3. Know computer functions/impact.					
3.1. Identify and describe computer operations.					
3.1.1. Identify input/output peripherals.			C	C	
Provide students with names of the parts of a computer system. Make a board display with pictures of the input and output peripherals used in the classroom. Have students identify peripherals on a worksheet.					

ACTIVITIES CHART
GRADE 2

GRADE 2	INSTRUCTIONAL AREAS CA	LA	MA	SI	SS
1. Feel confident about computer use.					
1.1. Interact with computer.					
1.1.1. Recognize computer instruction.		R	R	R	
Use programs that are delivered in a tutor mode. Have students identify how they instruct the computer in he various steps of use. Appropriate content: whole numbers, measurement, geometric shapes, weather, spelling patterns, word recognition, graphics and musical note discrimination.					
Provide problems delivered in a tutee mode, for example, LOGO. Have students show how they instruct the computer to carry out the program. Appropriate content: whole numbers, measurement, geometric shapes, graphics and music.		E	E	E	
1.1.2. Read instruction, keyboard and output.		R	R	R	
Use programs delivered in a tutor mode. Have students read aloud instructions as they carry them out. Have students read aloud outputs. This can be done with a partner, or to the teacher. Appropriate content: whole numbers, measurement, geometric figures, spelling, object identification, typewriting, alphabetizing, weather and graphics.					
Provide problem situations delivered in a tutee mode, for example, LOGO. Have students work in pairs to read aloud and carry out programming instructions.		E		E	

ACTIVITIES CHART
GRADE 2

GRADE 2	INSTRUCTIONAL AREAS CA	LA	MA	SI	SS
1.1.2. con't. Appropriate content: geometric figures, graphing, and measurement.					
1.1.3. Use control key/commands. Use program delivered in a tutor mode. Have students work in pairs or small groups identifying control keys as they work on keyboard. Have students discuss the difference between control keys and commands. Have students working in pairs or small groups identify commands as they are used. Appropriate content: whole numbers, measurement, geometric figures, object identification, spelling, and typewriting.		R	R	R	
Provide problem solving situation delivered in tutee mode. Have students work in small groups to identify the control keys and commands used in instructing the computer. Appropriate content: Geometric figures, graphing, measurement, graphics and music.			E	E	
1.1.5. Experiment as a user. Use programs that are delivered in a tutor mode. Allow students to devise alternate ways of solving problems and performing operations. Give students an opportunity to relate their discoveries. Appropriate content: geometric figures, measurement, graphing, weather, poetry, rhymes, music, graphics and games.			R	R	
1.1.6. Respond to error messages. Use prepackaged program that is delivered in a tutor mode. Have students read instructions to shape response to error messages. Appropriate content: whole numbers, geometric shapes, spelling patterns, measurements, and phonics.			R	R	

ACTIVITIES CHART
GRADE 2

GRADE 2	INSTRUCTIONAL AREAS				
	CA	LA	MA	SI	SS
1.1.6. con't. Provide prepackaged program in a tutee mode, for example, LOGO. Have students respond to oral/written instructions. Appropriate content: whole numbers, geometric shapes, music, measurements, graphics, object identification, typewriting, spelling, and graphing.			E	E	
1.4. Identify methods of communication with computer.					
1.4.2. Operate with words and symbols.		C E	C E	C E	
Use pictures, films, etc., to show the computer keyboard. Point out that we communicate (input information) with the computer by using words and symbols. Use the students experience with tutor and tutee programs to demonstrate the use of words and symbols, in order to make the computer operate. Appropriate content: computer functions, whole numbers, geometric figures, measurements, typewriting, and sentence structure.					
1.5. Develop positive attitude/behavior.					
1.5.1. Seek work/play with the computer.		E R	E R	E R	
Use programs presented in a tutor and tutee mode. Create a game atmosphere around use of program. Provide for small group or individual competition. Use acceptance and support techniques with shy and nonaggressive students. Use programs that address students by name. Create computer interest center for students to use during the day. Appropriate content: all computer tutor delivered programs, including games.					
1.5.2. Use positive affect words.		E R	E R	E R	
Get student responses to programs on a regular basis.					

ACTIVITIES CHART
GRADE 2

GRADE 2	INSTRUCTIONAL AREAS CA	LA	MA	SI	SS
1.5.2. con't. Reinforce those that are positive by providing adequate time on enjoyed tasks. Defuse points of tension: personalities, difficulties in understanding and need for time on machines.					
3. Know computer functions/impact.					
3.1. Identify/describe computer operations.					
3.1.1. Identify input/output peripherals.		C	C	C	
Use pictures or actual machines to identify the kinds of peripherals. Identify input keyboards, disk drives, tapes, telephone line from main frame, and touch screen. Identify output tapes, disks, telephone line, main frame, screen and printer. Define input and output.					
3.2. Recognize computer applications.					
3.2.1. Identify applications.	C			C	C
Identify computer applications from the school and community. Have students ask parents whether they work with computers and if so, what kind of work do the computers perform. Identify the computers students have observed in the community, schools, banks, grocery. Make a list of what the computers do. Appropriate content: career education, social impact, the immediate community.					
5. Recognize education/career opportunities.					
5.1. Recognize support/technical scientific careers.					

ACTIVITIES CHART
GRADE 2

GRADE 2	INSTRUCTIONAL AREAS CA	LA	MA	SI	SS
5.1.1. Identify local service personnel. Identify persons who work with computers in the local community. Have students interview these individuals to find out what their career duties are like. Take a field trip to a local business (bank, telephone company, etc.) and ask workers about their jobs. Get a speaker who is in a computer career to come to class and talk about careers in computers. Have students make a report on these careers.	C	C			C

ACTIVITIES CHART
GRADE 3

GRADE 3	INSTRUCTIONAL AREAS CA	LA	MA	SI	SS
1. Feel confident about computer use.					
1.1. Interact with computer.					
1.1.1. Recognize computer instructions.		R	R	R	
Use program delivered in a tutor mode. Have students write down the steps in using a program and identify each step when they instruct the computer. Appropriate content: whole numbers, measurement, decimals, fractions, geometric figures, problem solving, spelling, object identification, and classification.					
Provide programs delivered in a tutee mode, for example, LOGO. Have students make a bulletin board display showing how they instruct the computer. Appropriate content: measurement, geometric figures, graphing, problem solving, music, graphics and poetry.		E	E	E	
Provide problems and programs delivered in a tutee and tutor mode. Have students discuss how using a computer as an instructional device and as a device to be programmed are different and similar. Focus on the passive nature of computers requiring instruction for operation. Appropriate content: measurement, geometric figures, graphing, problem solving, music, graphics and poetry. Grade 3 Benchmark			E	E	
1.1.2. Read instructions, keyboards, output.					
Use programs that are delivered in a tutor mode. Have students demonstrate capacity to read with understanding instructions (manuals, worksheets, etc.), keyboard characters and output (screen or printed), by carrying out the program without assistance. Appropriate content: whole numbers, fractions, decimals, geometric figures, measurement, problem solving, spelling, sentence recognition, phonics and typewriting.					

ACTIVITIES CHART
GRADE 3

GRADE 3	INSTRUCTIONAL AREAS				
	CA	LA	MA	SI	SS
1.1.2. con't. Provide problem situations appropriate for tutee mode, for example, LOGO. Have students work from written instructions to demonstrate thorough, successful completion of the exercises, to show their capacity to read with understanding, instruction computer keys, and output. Appropriate content: measurement, geometric figures, graphing, problem solving, inferring/predicting, weather and nutrition. Grade 3 Benchmark			E	E	
1.1.3. Use control keys/commands.		R	R	R	
Activity: Use programs that are delivered in a tutor mode. Have students work independently to demonstrate capacity to use control keys and commands. Have students carry out program demanding use of control keys and commands. Appropriate content: whole numbers, measurement, fractions, decimals, geometric figures, spelling, object identification and classification. Provide problem situations appropriate for tutee mode, for example, LOGO. Have students work independently to demonstrate capacity to use control keys and commands. Have them carry out the resolution of this problem situation and then explain their use of control keys and commands. Appropriate content: measurement, graphing, problem solving, inferring/predicting, weather, nutrition and graphics. Grade 3 Benchmark			E	E	
1.1.4. Select/use written resources. Use programs that are delivered in a tutor mode. Provide students with machine operating instructions of different degrees of completeness. Have students select materials according to their perception of their capacity. Have students use materials in carrying out program.		R	R	R	

ACTIVITIES CHART
GRADE 3

GRADE 3	INSTRUCTIONAL AREAS				
	CA	LA	MA	SI	SS
1.1.4. con't. Appropriate content: whole numbers, measurement, fractions, decimals, geometric figures, spelling, object identification and classification.					
Provide situations suitable for use of a tutee delivery mode. Give students a selection of resource materials which describe operating procedures. Have students select resources according to their perception of their needs. Appropriate content: graphing, measurement, problem solving, and inferring/predicting.			E	E	
1.1.5. Experiment as a user.		R	R	R	
Use programs that are delivered in a tutor mode.					
Provide students with situation where only partial instructions are given - where operations must be discovered by experimentation. Use group feedback to reduce frustration and to identify alternative operations. Appropriate content: whole numbers, measurement, fractions, decimals, geometric figures, spelling, object identification, classification, and games.					
Provide a learning center where students can select programs for use or play. Appropriate content: whole numbers, measurement, fractions, decimals, geometric figures, spelling, object identification, classification, and games.		R	R	R	
Provide situations that accommodate tutee delivering modes, for example, LOGO. After students have some degree of mastery, give an open ended situation in which operational steps must be found. Appropriate content: graphing, measurement, problem solving, inferring/predicting, nutrition, graphics and poetry.		E	E	E	

ACTIVITIES CHART
GRADE 3

GRADE 3	INSTRUCTIONAL AREAS				
	CA	LA	MA	SI	SS
1.1.6. Respond to error messages.			E	E	
Use prepackaged programs in tutor and tutee modes. Have students use oral and written instructions and experimentation to respond to error messages.			R	R	
Have students discuss responses to error messages.					
Appropriate content: whole numbers, measurement, fractions, decimals, geometric figures, spelling, object identification, classification, graphing, problem solving, inferring, predicting, weather, nutrition, and graphics.					
1.2. Identify computer rules.					
1.2.1. Rationalize information processing.					
Use a film or other audiovisual material to show why use of computers requires input, processing and output.					
1.4. Identify methods for communicating with computers.					
1.4.2. Operate with words/symbols.			C E R	C E R	
Use tutee or tutor mode experience. Have students review the fact that they are making input into the computer with a particular set of words and symbols. Appropriate content: computer function, whole numbers, geometric figures, measurements, and linguistic symbols and signs.					
1.5. Develop positive attitude/behavior.					
1.5.1. Seek work/play with computers.		C	C	C	
Provide opportunities for students to use the computer as an alternative to normal instructional where appropriate.		R	E R	E R	

ACTIVITIES CHART
GRADE 3

GRADE 3	INSTRUCTIONAL AREAS CA	LA	MA	SI	SS
1.5.1. con't. Provide an environment and time where and when students, in groups or individually, can operate the computer. Accept computer generated homework.		C R	C E R	C E R	
Provide an accepting environment for the child with fears about use of the computer. Allow students to seek aid from peers on problems. Appropriate content: all computer content.					
1.5.2. Use positive affect words.		C	C E	C E	
Evaluate student attitude about the computer literacy program regularly. Reinforce positive response by accentuating "liked" part of program.		R	R	R	
Provide needed support, remediation where response is negative.					
3. Know computer functions/impact.					
3.1. Identify/describes computer operations.					
3.1.1. Identify input/output peripherals.		C	C	C	
Use films, audio visuals, worksheets to identify and name the peripherals of a computer system. Identify outputs and inputs. Discuss under what circumstance and output becomes an input. Grade 3 Benchmark					
3.1.2. Describe functions of input, output, and processing components.		C	C	C	
Use films, worksheets, printed material to describe the functions of input, output and processing components. Describe the general functions of input as instruction to the computer; processing components as operation of instruction and memory; outputs as reports on the results of operating on memory.					

ACTIVITIES CHART
GRADE 3

GRADE 3	INSTRUCTIONAL AREAS				
	CA	LA	MA	SI	SS
3.1.2. con't. Define computer memory as being similar to human memory and information kept.					
3.2. Recognize computer applications.					
3.2.1. Identify applications.	C	C	C	C	C
Identify the uses of computers by groups of agencies. Use films and printed material to show how computers are used in education, health and social services. Have students write an essay on such uses as data processing, process control, and information storage and retrieval in the agencies.					
5. Recognize education/career opportunities.					
5.1. Recognize support/technical/scientific careers.					
5.1.1. Identify local service personnel.	C	C	C	C	C
Bring people into the classroom to speak on careers in support services and scientific roles that have a computer connection. Use career education films, tapes and computer programs to provide career information to students.					

ACTIVITIES CHART
GRADE 4

GRADE 4	INSTRUCTIONAL AREAS CA	LA	MA	SI	SS
1. Feel confident about computer use.		E R	E R	E R	
1.1. Interact with computer.					
1.1.1. Recognize computer instruction.					
Continue to recognize need for computer to be instructed, as evidenced by employment of instructions in using the computer in tutor and tutee modes.					
Instruct students in the use of the computer as a word processor. Have students compare instructions when the computer is used as a tool with situations when it acts as tutor or tutee. Appropriate content: essays, and reports. Grade 3 Benchmark. Reinforcement.		L		L	L
1.1.2. Read instructions, keyboards, and outputs.		R L	E R	E R L	E R L
Continue to read instructions, keyboards, and outputs as evidenced by successful use of program components delivered in tutor, tutee, or tool mode.					
Instruct students in the use of the computer as a word processor. Have students work from handout or manual to carry out steps. Have students correct and polish output to demonstrate capacity to read instructions, keyboards, and output. Appropriate content: essays, reports, etc. Grade 3 Benchmark. Reinforcement.					
1.1.3. Use control keys/commands.					
Continue to use control keys and commands as evidenced in successful use of program components delivered in a tutor and tutee mode.		R	E R	E R	E R
Instruct students in use of the computer as a word processor.		L		L	L

ACTIVITIES CHART
GRADE 4

GRADE 4	INSTRUCTIONAL AREAS				
	CA	LA	MA	SI	SS
1.1.3. con't. Have students use special control keys and commands. Identify capacity to use these control keys and commands by the individual successfully carrying out of word processing task. Appropriate content: essays, reports, etc. Grade 3 Benchmark. Reinforcement.					
1.1.4. Select/use written resources.		R	R	R	R
Use programs that are delivered in a tutor mode. Provide students with a variety of operating instructions with different degrees of completeness and technical language. Have student select materials according to their perception of their needs. Appropriate content: whole numbers, fractions, decimals, geometric figures, ratio and proportions, measurement, problem solving, spelling, object identification, and classification.					
Provide situation suitable for use of tutee delivery mode. Give students a range of resources, detailing how to operate the computer having different degrees of technical language. Have students select and use resources that fit their stage of developing competency. Appropriate content: measurement, graphing, problem solving, inferring/predicting, graphics, data analysis, population studies, sentence structure, typewriting and music.			E	E	E
Instruct students in use of computer as a word processor. Give students various resources with differing degrees of technical languages detailing how to operate the computer. Have students select and use resources that fit their stage of competency. Appropriate content: essays, reports, etc.		L	L	L	L
1.1.5. Experiment as a user.		R	R	R	
Use prepackaged program with a tutor delivery mode.					

ACTIVITIES CHART
GRADE 4

GRADE 4	INSTRUCTIONAL AREAS CA	LA	MA	SI	SS
1.1.5. con't. Give students no operational instructions. Have them experiment on how to carry out the program. Appropriate content: essays, reports, and games.					
Provide students with a geometric figure generation situation in tutor delivery mode. Have students change the geometric configuration, size, and location.			E		
Instruct students in the use of word processing. Once students have the basic features down, allow them to experiment with more sophisticated operations. Appropriate content: essays, reports, etc.		L	L	L	L
Provide students with learning center where they can experiment with programs. Make requirement that each use of a new program requires identification of what new idea has been expanded.		L R	L E R	L E R	
1.1.6 Respond to error messages.			E	E	
Use prepackaged programs that are delivered in tutor and tutee modes. Have students use written instructions and experimentation to respond to error messages. Have students keep a log of successes and failures of responses. Appropriate content: essays, reports, and games.		R	R	R	
Use word processing program. Have students use oral and written instructions and experimentation to respond to error messages.		L	L	L	L
1.2. Identify computer rules.					
1.2.1. Rationalize information processing.		C	C	C	
Use audio visuals to explain why information must be organized and encoded before it can enter a computer, and that any output must be interpreted.					

ACTIVITIES CHART
GRADE 4

GRADE 4	INSTRUCTIONAL AREAS				
	CA	LA	MA	SI	SS
1.2.1. con't. Relate the sequence of information processing to word processing. Appropriate content: word processing, weather, nutritive intake, and class attendance.		L		L	L
Explain how information is organized, and encoded through a keyboard and interpreted on a screen or print display. Appropriate content: computer function.		C	C	C	
1.3. Explain algorithm/flowchart.					
1.3.1. Interpret algorithm/flowchart.			C		
Use films and other audio visuals to explain flowcharting and algorithms. Use a simple drill and practice program. Show the flowchart of the sequence and explain it. Relate flowchart to operation of the program. Use a simple drill and practice program o show the algorithm of the sequence and explain it. Relate the algorithm to the program. Compare the algorithm and flowchart representations of the program. Appropriate content: computer function, population studies, neighborhood problems.					
1.4. Identify methods for communicating with computers.					
1.4.1. Recognize programming languages.			C E	C E	
Use programming languages, such as LOGO, to build a simple program. Make explicit the fact that a language is being used. Define computer language operationally. Appropriate content: whole numbers, programming, geometric figures, computer functions, measurement and graphics.					
1.4.2. Operate with words and symbols.		C	C E	C E	C E
Use programming language, such as LOGO, to build simple programs. Have students use developed programs.		R	R	R	R

ACTIVITIES CHART
GRADE 4

GRADE 4	INSTRUCTIONAL AREAS CA	LA	MA	SI	SS
1.4.2. con't. Identify the words and symbols that make the computer operate. Appropriate content: whole numbers, computer functions, programming, geometric figures, measurement and signs and symbols.					
1.5. Develop positive attitude/behavior.					
1.5.1. Seek play/work with computers.	C	C L	C L E	C L E	C L E
Continue to offer opportunities for students to work at school and home with computers. Emphasize the idea that mastery of computers, to make them do their work, has special rewards of personal satisfaction and ultimately career opportunities. Appropriate content: all hands-on computer activities.	R	R	R	R	R
1.5.2. Use positive affect words.		C L	C L E	C L E	C L E
Continue to evaluate computer literacy program. Accentuate positive aspects and find ameliorating mechanisms for areas of negative response.		R	R	R	R
3. Know computer functions/impact.					
3.1. Identify/describe computer operations.		C	C	C	C
3.1.1. Identify input/output peripherals.					
Continue to use the names of input and output peripheral equipment. Add name of new equipment as introduced. Grade 3 Benchmark. Reinforcement.					
3.1.2. Describe functions of input, output, and processing components.		C	C	C	C
Use pictures, films and printed material to describe the function of output devices in detail; tapes, disks, printers, screens, telephone lines and syntheses.					

ACTIVITIES CHART
GRADE 4

GRADE 4	INSTRUCTIONAL AREAS CA	LA	MA	SI	SS
3.1.2. con't. Tell what they do and how the information is used. Describe the functions of input devices; touch screens, keys, tapes, disk drives, and telecommunication lines. Use worksheets to record and keep information.					
3.2. Recognize computer applications.					
3.2.1. Identify applications.	C	C	C	C	C
Identify the use of computers in business and industry. Use films and printed material. Have students write an essay on uses such as data processing, process control, information storage and retrieval.					
5. Recognize education/career opportunities.					
5.1. Recognize support/technical/scientific careers.	C	C	C	C	C
5.1.1. Identify national/international careers.					
Uses career education tapes, films and audio visuals to show the career opportunities in support and technical services in the wider national and international market. Grade 3 Benchmark. Reinforcement.	C	C		C	C
5.1.2. Identify national/international careers.					
Use career information to expand students understanding of career opportunities outside of Hawaii. Use magazines, and newspapers to show computer use elsewhere.					

ACTIVITIES CHART
GRADE 5

GRADE 5	INSTRUCTIONAL AREAS				
	CA	LA	MA	SI	SS
1. Feel confident about computer use.					
1.1. Interact with computer.					
1.1.1. Recognize computer instructions.		L	L	L	L
			E	E	E
Continue to recognize need for computer to be instructed as evidenced in employment of instructions in using the computer in tutor and tutee mode. Grade 3 Benchmark. Reinforcement.		R	R	R	R
1.1.2. Read instructions, keyboard, and output.		L	L	L	L
			E	E	E
		R	R	R	R
Continue to read instructions, keyboard and output as evidenced by successful use of program components that are delivered in tutor, tutee, or tool modes. Grade 3 Benchmark. Reinforcement.					
1.1.3. Use control keys and commands.		L	L	L	
			E	E	
Continue to use control keys and commands as evidenced by successful use of program components delivered in tutor, tutee and tool modes. Grade 3 Benchmark. Reinforcement.		R	R	R	
1.1.4. Select/use written resources.		R	R	R	R
Use programs that are delivered in a tutor mode. Provide students with a selection of worksheets and operating manuals of differing degrees of technical complexity. Give students a technical primary resource, then have them use other resources to interpret their primary resource. Appropriate content: whole numbers, fractions, decimals, geometric figures, ratios and proportions, trigonometry, object identification, measurement, problem solving, spelling simulation, classification, nutrition, graphics, population studies, compositions and speed reading.					

ACTIVITIES CHART
GRADE 5

GRADE 5	INSTRUCTIONAL AREAS CA	LA	MA	SI	SS
1.1.4. con't.					
Provide situations that fit a tutor mode of delivery. Give students a range of resources varying in technical complexity. Have students identify what they do not understand on the most technical instructions. Have them simplify the instructions using other resources. Have them use their own version. Appropriate content: measurement, graphing, problem solving, inferring/predicting, model building and data analysis.			E	E	E
Use a word processing or data processing context. Have students use format from existing handouts or manuals to write a simple set of operating instructions for a selected operation - "Their Manual." Have students compare "Their Manual" with other manuals. Appropriate content: data analysis and communication.		L	L	L	L
1.1.5. Experiment as a user.			E	E	
Present students with a simple program in a tutor mode. Have students program the computer to replicate example. Have students exchange programs and use them.					
Use learning center and allow students to experiment with computer use as class needs and student interest dictates. Appropriate content: whole numbers, fractions, decimals, geometric figures, ratios and proportions, trigonometry, object identification, measurement, problem solving, spelling, simulation, classification, nutrition, graphics, population studies, compositions and speed reading.		L R	L E R	L E R	L E R
1.1.6. Respond to error messages.		L	L E	L E	L E
Use tutor, tutee and tool instructional delivery modes.		R	R	R	R

ACTIVITIES CHART
GRADE 5

GRADE 5	INSTRUCTIONAL AREAS CA	LA	MA	SI	SS
1.1.6. con't. Monitor students to ensure they are gaining a capacity to operate independently in selecting and using error response information in manuals. Develop a group of "teacher aids" who can act as consultant when students "get stuck". Appropriate content: programs in all subject matter.					
1.2. Identify computer rules.					
1.2.1. Rationalize information processing.		C L	C L	C L	
Review reasons why information must go through a sequence of operations; organizing, coding, processing, and reporting. Use a worksheet and have students relate sequences to work with word processing. Appropriate content: computer functions and word processing.					
1.2.2. Determine structural components.					
Identifies the structural components of information processing, organizing, coding, and reporting. Use films or other audio visual aids to identify the components of processing. Make a bulletin board display of process. Have students identify where each process takes place. Appropriate content: computer operation.					
1.2.3. Sequence process steps.			C	C	
Identify the sequence in which information processing takes place. Use a film or other visual material to identify the sequence of organizing, coding, processing and reporting. Have students note which components of process takes place in the computer. Have students use worksheet diagrams to reinforce identification of sequence. Appropriate content: computer functions.					

ACTIVITIES CHART
GRADE 5

GRADE 5	INSTRUCTIONAL AREAS CA	LA	MA	SI	SS
1.2.4. Recognize computer processes.		C	C	C	C
Identify the kinds of operations that take place in the computer; searching, sorting, deleting, updating, summarizing storage, etc. Use film or other visuals to show these operations. Define the operation in terms of what they do to information. Use worksheets to give visual reinforcement of operations. Appropriate content: computer functions.					
1.3. Explain algorithm/flowchart.					
1.3.1. Interpret algorithm/flowchart.			C		
Use algorithms/flowcharts of different functions of computer for example, word processing, numbers operations, etc. Have students explain how they are alike and different.					
Have student explain algorithm/flowchart mode to describe simple program of their own making. Appropriate content: computer functions.					
1.4. Identify methods of communicating with computers.					
1.4.1. Recognize programming languages.			C	C	
Use programming language, such as LOGO or BASIC. Review the definition of a computer language. Have students explain how particular languages meet requirements of a computer language. Have students compare two languages for difference and similarities. Appropriate content: computer functions and programming.					
Compare the input of a tutor mode and program with the input of a programming language making a tutee program. Describe differences and similarities. Appropriate content: language, BASIC, and computer functions.			C E R		

ACTIVITIES CHART
GRADE 5

GRADE 5	INSTRUCTIONAL AREAS CA	LA	MA	SI	SS
1.4.2. Operate with words and symbols.		C	C	C	
			E	E	
Use the context of operating with tutor and tutee delivery modes to review the expanding sets of words and symbols used to operate the computer.		R	R	R	
Have students note the multiple use of symbols.					
Appropriate content: computer functions, and all computer applications.					
1.5. Develop positive attitudes/behavior.					
1.5.1. Seek work/play with computers.		L	L	L	L
			E	E	E
Continue to offer opportunities for students to work at school and home with computers.		R	R	R	R
Employ tools such as word processing so as to decrease the drudgery of copying reports and reformatting tables.					
Appropriate content: all hands-on computer operations.					
1.5.2. Use positive affect words.		C	C	C	C
		L	L	L	L
Continue to evaluate computer literacy program.			E	E	E
Reinforce positive aspects and seek to ameliorate negative aspects.			R	R	R
2. Use computer as a tool for problem solving/decision making.					
2.1. Use computerized information system.			E		
2.1.2. Create a program from a flowchart.					
Translate a given algorithm into a flowchart.					
Translate information in a given flowchart into an algorithm.					
Translate a given algorithm into a program.					
Translate flowchart information into a program.					
Appropriate content: algebraics geometric figures, population studies, and environmental studies.					

ACTIVITIES CHART
GRADE 5

GRADE 5	INSTRUCTIONAL AREAS CA	LA	MA	SI	SS
2.1.3. Develop an algorithm for problem solving.			E	E	E
Give a simple mathematical problem. Translate into algorithm form, and then translate algorithm into a computer program and solve the problem. Give a simple quantitative word problem. Translate into algorithm form, and then translate algorithm into a computer program and solve the problem. Appropriate content: algebraic ratio proportions, and population ratio solving problems.					
2.1.4. Assist in problem solving/decision making.			E	E	E
Provide students with simple decision problems. Using rain probabilities, show how computers help in decisions.					
3. Know computer function/impact.					
3.1. Identify and describes computer operations.					
3.1.1. Identify computer peripherals.		C	C	C	C
Continue to use the names of input and output peripheral equipment. Add names of new equipment as introduced. Grade 3 Benchmark. Reinforcement.					
3.1.2. Describe functions of input, output and processing components.		C	C	C	C
Use audio visuals and printed materials to describe the functions of input and output components. Use audio visual and printed materials to describe the functions of the processing components; control, memory, and arithmetic/logic. Use computers to show the location of processing components.					

ACTIVITIES CHART
GRADE 5

GRADE 5	INSTRUCTIONAL AREAS				
	CA	LA	MA	SI	SS
3.2.1. Identify applications.		C	C	C	C
Use audio visuals and printed materials to review computer applications in business, industry, education, health and social services. Use audio visuals and printed materials to identify computer applications in government, recreation and creative arts. Have students write reports on the role of data processing, process control, and information storage and retrieval. Have students simulate computer applications in any of the above mentioned fields. Appropriate content: nutrition, population studies, environmental studies, and disease control.					
3.3. Recognize affect on daily life.					
3.3.4. Value communication/information.	C	C	C	C	C
Organize an interschool project for the exchange of information (economic, social, and environmental). Use telecommunication link through computers. Explain simultaneous transmission of information, direct communications, and asynchronous transmissions (leave messages for later reading). Compare costs, convenience and precision of information with telephone.					
5. Recognize education/career opportunities.					
5.1. Recognize support/technical/scientific careers.					
5.1.1. Identify local service personnel.	C	C	C	C	C
Continue to recognize local computer service careers. Grade 6 Benchmark. Reinforcement.					

ACTIVITIES CHART
GRADE 5

GRADE 5	INSTRUCTIONAL AREAS				
	CA	LA	MA	SI	SS
5.1.2. Identify national/international careers. Use career education audio visuals and printed materials related to careers in computers. Explain scientific and engineering careers. Take a class trip to an international computer corporation. Interview computer engineers and electrical engineers.	C	C	C	C	C

ACTIVITIES CHART
GRADE 6

GRADE 6	INSTRUCTIONAL AREAS CA	LA	MA	SI	SS
1. Feel confident about computer use.					
1.1. Interact with computer.					
1.1.1. Recognize computer instructions.		L R	L E R	L E R	L E R
Continue to recognize need for computer to be instructed as evidenced in employment of instructions in using the computer in tool, tutor and tutee modes. Grade 3 Benchmark. Reinforcement.					
1.1.2. Read instructions, keyboard, and output.		L R	L E R	L E R	L E R
Continue to read instructions, keyboard and output as evidenced by successful use of program components that are delivered in tutor, tutee, or tool modes. Grade 3 Benchmark. Reinforcement.					
1.1.3. Use control keys/commands.		L R	L E R	L E R	
Continue to use control keys and commands as evidenced by successful use of program components delivered in tutor, tutee and tool modes. Grade 3 Benchmark. Reinforcement.					
1.1.4. Select/use written resources.		L R	L E R	L E R	L E R
Present instructions for program use in "handout" or manual form. Have students use written resources to operate computer in tutor, tutee, and tool modes.					

ACTIVITIES CHART
GRADE 6

GRADE 6	INSTRUCTIONAL AREAS CA	LA	MA	SI	SS
1.1.4. con't. Have students demonstrate independence of verbal instructions by relying solely on written resources. Appropriate content: all subject matter. Provide students limited situation to write an operating manual for tutor, tutee, and tool mode of delivery. Have students exchange and evaluate manuals selecting and using the "best". Appropriate content: all subject matter. Grade 6 Benchmark.					
1.1.5. Experiment as a user. Provide students with open atmosphere conducive to trial of ideas on the computer. Have students keep logs of experimentation. Have students share their insight, innovations and inventions with peers. Solicit peer evaluation. Appropriate content: all subject matter. Grade 6 Benchmark.		L E R	L E R	L E R	L E R
1.1.6. Respond to error messages. Provide students with continuing stimulations to become a self-reliant user of computers through personal capacity to appropriately respond to error messages. Use student peers to assist when students get stuck. Periodically quiz students on their response to common and uncommon error message situations. Appropriate content: all subject matter. Grade 6 Benchmark.		L E R	L E R	L E R	L E R
1.2. Identify computer rules.					
1.2.1. Rationalize information processing. Review reasons why information must be processed in an ordered sequence of steps--organizing, coding, processing and reporting. Use worksheets to explain the functions of each step.	C	C L	C L	C L	C L

ACTIVITIES CHART
GRADE 6

GRADE 6	INSTRUCTIONAL AREAS CA	LA	MA	SI	SS
1.2.1. con't. Relate sequence to computer operations in word processing. Appropriate content: computer functions and word processing. Grade 6 Benchmark.					
1.2.2. Determine structural components. Identify the structural components of information processing, organizing, coding and reporting. Use worksheets and audio visual aids to identify components. Have students identify structural components in their use of tool and tutee modes. Appropriate content: computer functions. Grade 6 Benchmark.			C	C	
1.2.3. Sequence process stage. Review the sequence of steps in information processing; organizing, coding, processing and reporting. Use worksheets and audio visual aids to reinforce the sequence, noting which processing components take place in and out of the computer. Have students identify the sequence of steps in their own use of computers. Appropriate content: computer functions. Grade 6 Benchmark.					
1.2.4. Recognize computer processes. Review the kinds of operations that take place within the computer; searching, sorting, deleting, updating, summarizing, storing, etc. Review the definitions of each operation. Use worksheets and audio visual aids to reinforce the nature of each operation. Appropriate content: computer functions		C	C	C	C
1.3. Explain algorithm/flowchart.					

ACTIVITIES CHART
GRADE 6

GRADE 6	INSTRUCTIONAL AREAS				
	CA	LA	MA	SI	SS
1.3.1. Interpret algorithm/flowchart. Continue use of algorithms and flowcharts to interpret computer logic. Have students make an algorithm and/or a flowchart to show the logic of their operations. Appropriate content: computer functions and algebraics.			C		
1.3.2. Generalize uses. Show the systematic nature of yes/no decisions. Show how an algorithm or flowchart could be used to express probability. Appropriate content: problem solving, decision making, and computer functions.				C	C
1.3.3. Discuss applications. Review applications of algorithms and flowcharting. Have students explain the reasons for their use.					
1.4. Identify methods of communicating with computers.					
1.4.1. Recognize programming languages. Review the function of programming languages--that they are used to instruct computers. Have students list how programming language differ from other kinds of input. Read text material on programming computers. Appropriate content: computer functions and all computer applications.			C E R	C E R	
1.4.2. Operate with words and symbols. Review the function of words and symbols in instructing computers. Take notice of new words and symbols that are used in instructing the computer in tutee and tutor modes. Appropriate content: computer functions and all computer applications.	C R	C R	C E R	C E R	C E R

ACTIVITIES CHART
GRADE 6

ACTIVITIES CHART GRADE 6	INSTRUCTIONAL AREAS				
	CA	LA	MA	SI	SS
1.5. Develop positive attitude/behavior.					
1.5.1. Seek work/play with computer.		C	C	C	
			E	E	
Continue to offer opportunities for students to work at school and home with computers. Employ word processing and other information processing techniques to decrease the drudgery of producing reports and handling large volumes of data. Emphasize this labor reducing capacity of the computer. Appropriate content: all computer components. Grade 6 Benchmark.		R	R	R	
1.5.2. Use positive affect words.		C	C	C	C
		L	L	L	L
Continue to evaluate computer literacy program, reinforcing positive aspects and ameliorating negative aspects. Grade 6 Benchmark.			R	R	R
2. Use computer as a tool for problem solving and decision making.					
2.1. Use computerized information systems.					
2.1.1. Use computer in decision making.				R	R
Use a tutor mode program to develop the idea of using the computer to assist in decision making. Appropriate content: classroom time allocation decisions, work schedule decisions and environmental simulations. Grade 6 Benchmark.			E	E	
2.1.2. Create a program from a flowchart.					
Review use of translating simple flowcharts data into programs. Use word problems as basis of flowchart to translate into programs. Increase the steps in the flowchart for which program is to be developed according to student capacity. Appropriate content: algebraic word problems, ratio and proportion and environmental problems.					

ACTIVITIES CHART
GRADE 6

GRADE 6	INSTRUCTIONAL AREAS				
	CA	LA	MA	SI	SS
2.1.3. Develop algorithm for problem solving.			E	E	E
Use word problems and develop algorithm. Develop computer program and test algorithm. Use mathematical problems with increasing number of operations to develop an algorithm. Appropriate content: algebraic word problems and environmental problems.					
2.1.4. Assist in problem solving/decision making.			E	E	E
Provide simple decision matrix. Have students use computer to determine probability of event in percent. Show how this knowledge helps in decision making.					
3. Know computer functions/impact.					
3.1. Identify/describe computer operations.					
3.1.1. Identify input/output peripherals.		C	C	C	C
Continue to use names of input and output peripherals. Add names as new peripherals are introduced. Grade 3 Benchmark. Reinforcement.					
3.1.2. Describe functions of input and output processing components.		C	C	C	C
Use audio visual and printed materials to review the functions of input and output components and processing material. Use audio visual and printed materials to show different combinations of equipment. Discuss how functions can change by exchanging the component equipment. Use different equipment hookups to demonstrate the different functions. Grade 6 Benchmark.					

ACTIVITIES CHART
GRADE 6

GRADE 6	INSTRUCTIONAL AREAS				
	CA	LA	MA	SI	SS
3.2. Recognize computer applications.					
3.2.1. Identify applications.	C		C	C	C
Use audio visuals and printed materials to review computer applications in industry, business, education, health, social services and creative arts. Use audio visual and printed material to identify computer applications in government, recreation and creative arts. Have students write reports on the role of data processing, process control and information storage and retrieval. Compare the role of computers in each of the social entities -- under what circumstances is informational storage and retrieval, data processing and process control applicable? How are applications similar or different? Grade 6 Benchmark.					
3.3. Recognize affect on daily life.					
3.3.1. Value efficient information processing.		C			C
Call upon student's experience or describe, during semester, work with and without computers: contrast word processing with handwritten assignments needing corrections. Contrast drawing geometric figures of various sizes and angularity with computer generation of same figure. Contrast hand correction of tests with computer correction. Develop a definition of efficiency and discuss the value to the individual, school and society.					
3.3.2. Understand pros and cons of routine tasks.		C	C		
Use student's experience in performing routine tasks: washing dishes, making beds, performing mathematical operations and spelling words.					

ACTIVITIES CHART
GRADE 6

GRADE 6	INSTRUCTIONAL AREAS				
	CA	LA	MA	SI	SS
3.3.2. con't. Discuss or write an essay on the advantages of person over machine's function - cost, (some cases) humans faster, inconvenience of having a machine, or when the machine can't do the whole task. Discuss or write an essay on the advantages of a person over a machine - boredom, personnel, time consuming, less exact, and machines can do some things that humans can't. Develop guidelines as to when one might use a machine to do a task rather than a human - cost less, human can't do task, uses less time, and is more enjoyable.					
3.3.3. Appreciate economic benefits. Use data on the volume of items handled in banks, telephone companies, stock exchanges, etc., before and after the incorporation of computers. Discuss or write reports on revenue returns and rate charges, and employment resulting from this traffic. Use a periodical review to find the positive impact of computer, use of robots in the auto, steel refineries and other industries. Use a periodical review to find the impact of computers on engineering and the quality of economic products. Use audio visual and printed material to provide a base for class discussion of the economic benefits of computers.	C	C	C	C	C
3.3.4. Value communication/information. Use audio visual and printed material to show the extent of present world-wide computer networks. Discuss that different networks are used in banking, government, telecommunications and for technical purposes. Discuss the value to society of these networks in a time of exploding commercial and knowledge transmission. Use telecommunication connections with other schools to share information on the environment and community where the students play. Grade 6 Benchmark.	C	C	C	C	C

ACTIVITIES CHART
GRADE 6

GRADE 6	INSTRUCTIONAL AREAS CA	LA	MA	SI	SS
3.3.5. Identify applications of computer science.	C	C	C	C	C
Use audio visual and printed materials to show the applications of computer science and technology in medicine, law enforcement, education, engineering, business, transportation, military, recreation, government, library and creative arts. Take the class on a field trip to selected places within the community where computers are used in divergent ways.					
3.4. Differentiate science/technology.					
3.4.1. Know evolution of electronic technology.	C	C	C	C	C
Use audio visual and printed materials to tell the history of electronic technology with an emphasis on computers. Have students make a pictorial history of evolving technology. Have students do a biographical study of people who have contributed to computer technology. Grade 6 Benchmark.					
4. Recognize limitation/usefulness.					
4.1. Recognize disadvantages.		C	C	C	C
4.1.1. List limitations.					
Call upon student's experience with computers to elicit a list of limitations: cost, difficulty in debugging, GIGO - garbage-in-garbage-out, training of operators and fear of replacement of humans. Have students discuss limitations to determine which might limit their personal use and which might limit society's use.					
4.2. Identify some major applications.					
4.2.1. Describe how computers assist people.	C	C	C	C	C
Use these activities along with 4.1.1. (above), to give counter weight to disadvantages.					

ACTIVITIES CHART
GRADE 6

GRADE 6	INSTRUCTIONAL AREAS CA	LA	MA	SI	SS
Have students list major people who assist in applications, do routine tasks, create new jobs, expand communication, provide greater precision and better quality control, etc. Have students compare disadvantages and limitations with advantages. Address the question, "Computer a menace or a panacea?"					
5. Recognize education/career opportunities.					
5.1. Recognize support/technical/scientific-ic/integrated fields careers.					
5.1.1. Identify local service personnel.	C	C	C	C	C
Continue to discuss career opportunities of a local nature. Grade 3 Benchmark. Reinforcement.					
5.1.2. Identify national/international careers.	C	C	C	C	C
Use career education audio visual material and computer software to review career opportunities at both the national and international levels. Stress educational requirements when counseling students about entering secondary school. Grade 6 Benchmark.					
5.1.3. Compare educational requirements/ opportunities.	C	C	C	C	C
Use career education audio uals and software materials to identify careers where computers are used, but are not a primary job requirement...the sciences, various fields of engineering, checkout clerks, bank personnel, etc. Identify the educational requirements as part of the secondary school counseling.					

Suggested Sample Activities

The suggested sample activities support the performance expectations of the Taxonomy. They are developed to help teachers and students "get started" and are not designed to be the only method of presentation of materials. After using these sample activities, teachers should continue to apply similar ideas to expand classroom teaching and problem-solving experiences.

SAMPLE ACTIVITY #1

Grade: K

Performance Expectation(s): 1.1.1. Recognize Computer Instructions

Prerequisite(s): None

Material(s): None

Software/Materials that Could be Incorporated into the Lesson:

Memory: The First Step in Problem Solving (IBM)
Katie and the Computer
The Voice (Apple)
Facemaker, (Apple)
Delta Drawing (Apple, IBM)
Early Games Piece of Cake (Apple, IBM)

Time for Activity:

One or more class periods

Teacher Preparation:

1. Tell children that they must follow step-by-step instructions to work with a computer. Compare step-by-step instructions to the following steps in getting ready for school this morning:

   a. wake up
   b. wash face
   c. put on clothes
   d. eat cereal
   e. brush teeth
   f. catch school bus

2. Explain that problems or "buggies" can "mess up" morning plans. For example:

   a. wake up too late
   b. No clean clothes
   c. out of cereal
   d. miss school bus

3. Relate this step-by-step procedure to the way one must work with a computer. Remind students that by not following directions they run into "buggies" when working with a computer. Tell students that they will be asked "Yes/No" questions and must answer exactly "Yes" or "No". Later children can be introduced to the Yes key (Y key of keyboard) and No key (N key of keyboard). Then show children a software program that asks for "Yes/No" responses.

SAMPLE ACTIVITY #2

Grade: K

Performance Expectation(s): 1.1.3. Use Control Keys/Commands

Prerequisite(s): No prerequisites for this activity

Material(s):

Colored index cards containing 4 direction arrows and dot or hole punch at bottom.

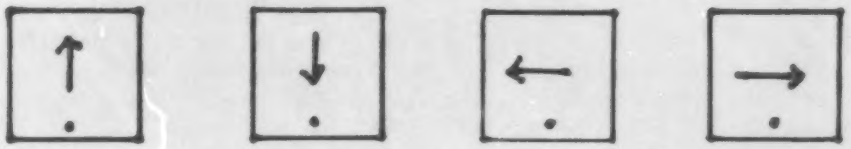
Software/Materials that Could be Incorporated into the Lesson:

E-Z LOGO (Apple)

Time for Activity:

One or more class periods.

Teacher Preparation: Prepare index cards.



1. Each student should have index cards of different colors with LOGO direction arrows painting forward (↑), back (↓), left (←), and right (→). A dot or hole punch should be placed at the bottom of the card.

2. Teacher should demonstrate each direction card by moving one step forward, back, left, right, while holding the appropriate arrow key.

3. Next the teacher should have students hold the LOGO left key (←) with their hand holding the card on the dot (hole punch). Ask them to move in the direction of the card. Continue this activity with the right direction card.

4. Ask students to name some "buggies" of this activity.

   a. run into one another
   b. run into wall
   c. bump into furniture

Relate this activity to the direction keys on the computer keyboard. Tell students they will use the direction keys to move things around on the computer screen. At a later time show children a software program that uses the direction keys.

SAMPLE ACTIVITY #3

Grade: K

Performance Expectation(s): 3.1.1. Identify Input/Output Peripherals

Prerequisite(s): None

Material(s):

Computer keyboard, screen, tape recorder or disk drive and printer. Cut out pictures from old magazines.

Software/Materials that could be Incorporated into the Lesson:

a. Katie and the Computer
b. Computer Tutor Junior
c. Don't (or How to Care for Your Computer)

Time for Activity:

One or more class periods.

Teacher Preparation:

1. Remind children about the way they receive facts or information. They learn what their lunch will be by touching the food, hearing their parents tell them, seeing and smelling the meal, etc. Tell them computers take in and put out information in a similar way.

2. Show them how computers take in facts:

   a. touching the keyboard
   b. tape recorder
   c. disk drive

3. Show them how computers put out facts:

   a. screen
   b. printer

4. Now point to equipment or hold up magazine pictures and ask children to identify the parts as keyboard, screen, tape recorder, disk drive, or printer. Ask them to tell whether it is used to input or output facts.

SAMPLE ACTIVITY #4

Grade: 1

Performance Expectation(s): 1.1.2. Read instruction, keyboard and output
1.1.3. Use control keys/commands

Prerequisite(s):

Children can recognize letters in isolation and as part of words.

Material(s):

Colored chalk, chalkboard; cut out keys to represent number keys, Y key, N key, Return or Enter key, space bar, +, - keys, poster board computer screen.

Software/Materials that could be Incorporated into the Lesson:

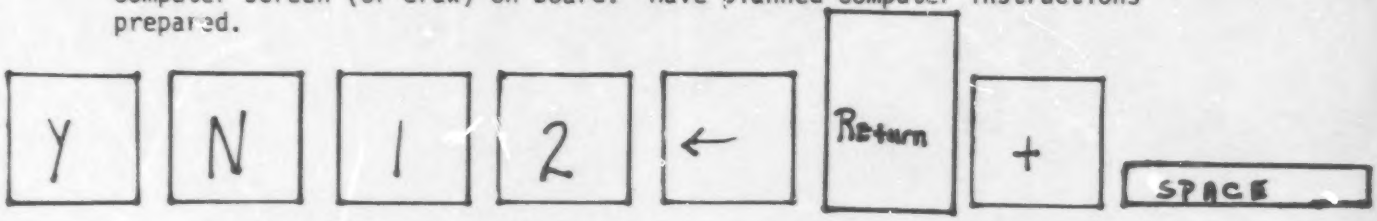
Gertrude's Secrets (Apple)
The Voice (Apple)
Bumble Games (Apple)
Plotting and Programming Adventures of the Lollipop Dragon
Juggles Rainbow (Apple)
Gertrude's Puzzles (Apple)
Visual Discrimination (Apple, TRS-80)

Time for Activity:

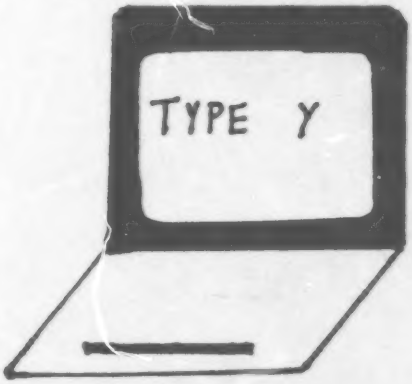
Two twenty-minute lessons.

Teacher Preparation:

Use 5"x8" index cards at front of chalkboard on chalk tray. Hang cut out computer screen (or draw) on board. Have planned computer instructions prepared.



1. Teacher prints on the computer screen certain instructions and asks children to choose the answer by picking the key from the chalk tray. Teacher erases instructions and then starts over.



Other instructions:
a. Type return
b. 5 + 2 = ?
c. + + = ?
d. + + - = ?
e. Hit space bar

2. Teacher has sample keyboard copied for each student. The teacher then prints instructions on the board and has students answer on his/her own keyboard.

SAMPLE ACTIVITY #5

Grade: 1

Performance Expectation(s): 1.1.3. Use Control Key Commands
1.1.5. Experiment as a User
1.1.6. Respond to Error Messages

Prerequisite(s):

Children can recognize letters in isolation and as part of words.

Material(s): Computer applications software containing error messages.

Software/Materials that could be Incorporated into the Lesson:

Sticky Bear (Apple)
Sticky Bear Numbers (Apple)
Sticky Bear Shapes (Apple)
The Voice (Apple)
Facemaker (Apple)
Rocky's Boots (Apple)

Time for Activity:

Two twenty-minute sessions.

Teacher Preparation: Read through activity and prepare computer.

1. Ask children to tell what can happen if they do something they are not supposed to do. Elicit responses such as:

   a. I am told "No"
   b. My mom gets mad
   c. Teacher calls my name out loud

2. Explain to children that computers also respond to errors with error messages on the screen, "Beep" sounds, and even blinking pictures.

3. Explain to children that computers are friendly and usually give the user another chance. Give examples of error messages such as:

   a. No
   b. Oops!
   c. Try again!
   d. Type "Y" or "N" only

Show students a software program that has error messages.

SAMPLE ACTIVITY #6

Grade: 1

Performance Expectation(s): 1.5.2. Use Positive Affect Words

Prerequisite(s): None

Material(s): Universal Produce Code (UPC) on cans, boxes, etc.

Software/Materials that could be Incorporated into the Lesson:

Computers in Your Life, Computer Careers Handbook, Computer Parade, Computers for Kids, Katie and the Computer

Time for Activity:

Field trip and two class periods (one prior to trip and one after trip.)

Teacher Preparation:

Arrange for field trip to a local computerized supermarket.

1. Ask students to bring to class a grocery can or box, such as a cereal box, with the coded bar mark (UPC code). Pass the items around and have children find the coded bar mark. Have students volunteer ideas about the bar-code, what it means, and how it is used.

2. Explain that the bar marks are a code that a computer program can read and understand. The code tells the name of the item, the company that makes it, and the cost. Ask students if they have seen a supermarket checkout person slide groceries over a lighted panel or slide a lighted wand over the bar-code. Explain that the light is scanning a code and sending information to a computer.

3. Tell students about the planned field trip, what they will do on the trip, and what they are expected to find:

   a. How the checker reads the bar-code.
   b. Where the bar-code information goes.
   c. What the computer does with the information.
   d. What information comes back (on a receipt).
   e. What the store manager does with the information.

4. Have students talk with the store manager, checkout person, and clerks. Students should observe the checkout lines, stockroom, and shelf coding.

5. After the field trip have students discuss what they have learned on their field trip. Next have students draw their own bar-code and decode for each other.

6. Other suggested field trips:

   a. Bank
   b. Automated teller
   c. Computerized library
   d. Computer center for traffic department

SAMPLE ACTIVITY #7

Grade: 2

Performance Expectation(s): 1.1.1. Recognize Computer Instructions

Prerequisite(s):

Students can verbally say the alphabet.

Students recognize letters in isolation and as parts of words.

Material(s): Chalkboard turtle such as the example.

Software/Materials that could be Incorporated into the Lesson:

Turtle Tricks: An Introduction to Turtle Graphics and Apple LOGO (activity Cards - Apple)

E-Z LOGO (Apple)
Apple LOGO (Apple)
Dr. Logo (IBM)
PC LOGO (IBM)
TRS-80 Color LOGO (Radio Shack)
LOGO: An Introduction (Barnett)
LOGO Cards: Activities for Apple LOGO (Apple)
LOGO Reference Flip Chart (Apple)
Exploring LOGO Without a Computer

Time for Activity: Two twenty-minute sessions

Teacher Preparation:

Cut out a cardboard isosceles triangle and draw a turtle on the front with the head of the turtle pointing to the smallest angle. Glue a magnet on the back of the triangle.

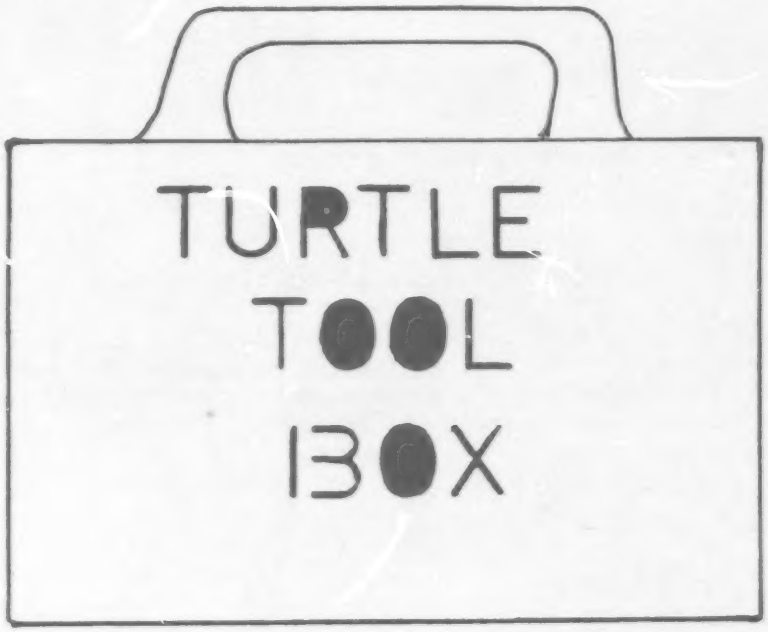
1. This activity will be a lead-in to using LOGO on the computer. Explain that LOGO is a language to use on the computer and LOGO uses a turtle. Explain that the computer has to be told what to do with the turtle.

Certain instructions or commands must be given to tell the computer to instruct the turtle. List some of the commands:

Show Turtle	ST
Clear Screen	CS
Forward	FD
Back	BK
Right	RT
Left	LT

2. Now demonstrate on the board what happens when each command is given. Show that CS makes the turtle disappear, etc. This lesson can be expanded to include distance and angle measure such as FD 5, RT 90, etc. When students show readiness, refer to Activity # 11 grade 3..

   Label and decorate a LOGO TOOL BOX to keep your turtle at home!



SAMPLE ACTIVITY #8

Grade: 2

Performance Expectation(s): 1.1.6. Respond to Error Messages
1.4.2. Operates with Words and Symbols

Prerequisite(s):

Students recognize letters of alphabet in isolation and as parts of words.

Material(s): Computer keyboard sheets; overhead transparency

Software/Materials that could be Incorporated into the Lesson:

Bumble Games (Apple)
Early Games Music (Apple, IBM)
Early Games Piece of Cake (Apple, IBM)
Facemaker (Apple)
Gertrude's Puzzles (Apple)
Gertrude's Secrets (Apple)
Sticky Bear Series (Apple, IBM)
The Voice (Apple)

Time for Activity: One twenty-minute session

Teacher Preparation:

Prepare computer keyboard sheets and overhead transparency.

1. Have a copied picture of the computer keyboard for each student. Also have a transparency made of the keyboard to show on the overhead projector. Demonstrate how a student can respond to questions on the computer by using the overhead transparency. Show responses to the following cues:

	Response
a. ▲ + ▲ + ▲ = ?	Press 3 key
b. 1 + 1 + 1 = ?	Press 3 key
c. 10 - 2 = ?	Press 8 key
d. Press return key (Enter)	Press Return Press ⏎
e. More ?	Press Y for Yes Press N for No
f. Control Key	Press Control Key
g. Press Space Bar	Press Space Bar
h. Quit ?	Press Y or N
i. Stop ?	Press Y or N
j. Press Return Key	Press Return key

2. Show students what can happen if they press an incorrect key. Give examples of error messages: computer beep, computer noise, try again, oops!, Sorry you're wrong, incorrect.

Now let students respond to certain "teacher generated cues" by using their copied keyboard.

3. Later show students how to answer the same cues on the computer keyboard. Let students experiment with answering cues by using applications software.

SAMPLE ACTIVITY #9

Grade: 2

Performance Expectation(s): 5.1.1. Identify Local Service Personnel

Prerequisite(s): None

Material(s): Computer magazines

Software/Materials that could be Incorporated into the Lesson:

The Computer Careers Handbook

Time for Activity:

Discussion time is twenty minutes. Plans for field trip or speaker should include a discussion before and a discussion after.

Teacher Preparation: Cut out pictures from computer magazines.

1. Ask students if their parents work with computers. Ask a parent or a computer career person to talk about their career with computers.

2. Identify different careers that involve computer use. Find pictures from computer magazines and cut them out. Ask students to guess what they do and to guess how they would use computers. For example:

   a. Supermarket checker
   b. Bank teller
   c. Game arcade repair person
   d. Doctors and nurses
   e. Car manufacturers
   f. Airport personnel
   g. Telephone operator
   h. Secretary
   i. School teacher
   j. Computer repair person

3. Plan a field trip to a site where computers are used.

SAMPLE ACTIVITY #10

Grade: 3

Performance Expectation(s): 1.1.1. Recognize Computer Instructions
1.1.2. Read Instructions, Keyboards, Output

Prerequisite(s):

Students need to have had experience with computer "bugs" in a verbally spoken procedure.

Material(s):

Copy of attached story.

Software/Materials that could be Incorporated into Lesson:

Teaching BASIC Bit By Bit
My Friend - The Computer
Rocky's Boots (Apple)

Time for Activity: Forty minutes

Teacher Preparation:

Make copies of the story, "Robbie-the-Robotics-Machine"

1. Review with students the idea of a procedure as a set of instructions for solving a problem. Write a problem-solving procedure for doing your science homework and elicit student's responses. For example:

    a. Turn off the TV
    b. Clear the desk or table
    c. Open your science book
    d. Read the chapter
    e. Sharpen your pencil
    f. Get out paper
    g. Answer the questions

2. Show the students' ideas in a flowchart as the discussion progresses.

3. Name some "bugs" that can occur.

    a. Brother turns on TV again
    b. Mother asks you to set the table for dinner
    c. You left your science book at school
    d. Your pencil lead breaks

4. Hand out copies of the attached story to students. Have the students read the story and then ask questions such as:

   a. Did Robbie do as he was told?
   b. Do robots have brains?
   c. The procedure step "Repeat procedure for all clothes" caused Robbie to go back to step 1 and repeat the entire procedure. What was the "bug" in the procedure? How can it be changed?

5. Let the whole class write a new improved procedure or let students individually write a new procedure.

Robbie-the-Robotics-Machine

I'd like to introduce you to my friend, Robbie-the-Robotics-Machine. I call him "Robbie" for short. Mom and dad ordered "Robbie" from the Sears Robot Catalogue. Mom likes him because he can vacuum the rug, wash the dishes, and make up the bed. Dad likes Robbie because he takes out the garbage at night. And I like Robbie because he's so nice. Robbie is even more fun than my sister Jessica or my brother Loi.

Robbie has a computer chip for a brain and is very good at remembering things. But he is so hard-headed when mom has to teach him a new chore. Every step must be explained very carefully. Mom says Robbie does only what a human tells him to do. If directions are not right, Robbie can really mess up.

Mom had to wash clothes so she gave Robbie these steps to follow:

Procedure: WASH CLOTHES

1. Put clothes in washer.
2. Put ½ cup of detergent in washer.
3. Turn washer on.
4. If clothes are clean, go to Step 7.
5. If clothes are not clean, go to Step 2.
6. Take clothes out.
7. Put clothes in dryer.
8. Repeat procedure for all clothes.

Mom gave the instructions to Robbie and then went to the store. Robbie did exactly as he was told. Guess what he did?

When mom came home, Robbie was still washing clothes. The box of detergent was empty, the dryer was stuffed full, and Robbie was pulling clothes from everywhere--my closet, mom's and dad's drawers, Jessica's doll house, and even Loi's toy box.

Mom shouted, "Robbie why are you washing all the clothes in the house?"

"I am following the procedure you gave me," said Robbie.

I thought about mom's steps again. Of course! she had left out some very important directions.

What did mom do wrong? Can you help us tell Robbie how to wash clothes?

SAMPLE ACTIVITY #11

Grade: 3

Performance Expectation(s): 1.1.1. Reocgnize Computer Instructions
1.1.2. Read Instructions, Keyboards, Output

Prerequisite(s):

Students should realize that LOGO is a computer language that uses commands. They also should have previously identified steps to solve a problem or build a procedure.

Material(s):

Poster board for chart, three sheets of graphing grid paper and a ruler for each student.

Software/Materials that could be Incorporated into Lesson:

Turtle Tricks: An Introduction to Turtle Graphics and Apple LOGO (activity Cards - Apple)

Apple LOGO (Apple)
Dr. Logo (IBM)
PC LOGO (IBM)
TRS-80 Color LOGO (Radio Shack)
LOGO: An Introduction (Barnett)
LOGO Cards: Activities for Apple LOGO (Apple)
LOGO Reference Flip Chart (Apple)
Exploring LOGO Without a Computer
Turtle Tricks: An Introduction to Turtle Graphics and Apple LOGO (Apple)

Time for Activity:

Teaching time twenty minutes; student work time 20-25 minutes

Teacher Preparation:

Prepare the chart below. Prepare graph paper and develop procedures for students to practice.

1. Prepare a chart with the following commands, abbreviations, and examples:

Command	Abbreviation	Correct Example	Incorrect Example
Clear screen	CS	CS	C S (cannot have space)
Show turtle	ST	ST	S T " " "
Forward	FD	FD 50	FD50 (needs space between FD and 50)
Back	BK	BK 60	BK60 " " " "
Right	RT	RT 90	RT90 " " " "
Left	LT	LT 45	LT45 " " " "
Home			

2. Draw a grid on the chalkboard or transparency for the overhead projector. Follow these commands on your grid:

```
Clear Screen
Home
Forward 3
Right 90
Forward 3
Right 90
Forward 3
Right 90
Forward 3
Right 90
```

3. Give each student several pieces of graph paper. Ask them to sketch the above given commands on their paper.

4. Now ask students to use a straight edge and draw a large square around the square already drawn on their paper. Stress that the small square must be in the interior of the large square. After drawing ths square, ask them to write the procedure/steps you would have to use with LOGO. For example:

```
Clear Screen
Home
Forward 5 (must be larger than 3)
Right 90
Forward 5
Right 90
Forward 5
Right 90
Forward 5
Right 90
```

5. On a separate sheet of grid paper ask students to sketch:

```
CS
Home
Rt 90
FD 2
Lt 90
FD 3
Rt 90
FD 7
Rt 90
FD 3
Lt 90
FD 2
```

6. Make other procedures for students to follow. Eventually expand the commands on the chart. Allow students to carry out the same activities on the computer.

SAMPLE ACTIVITY #12

Grade: 3

Performance Expectation(s):
1.1.1. Recognize Computer Instructions
1.1.2. Read Instructions, Keyboards, Output
1.1.3. Use Control Keys/Commands
1.1.5. Experiment as a User
1.1.6. Respond to Error Messages
1.4.2. Operate with Words/Symbols
3.2.1. Identify Applications

Prerequisite(s):

Familiarity of keyboard and knowledge of how to load a word processing program.

Material(s): Word processing program

Software/Materials that could be Incorporated into the Lesson:

Bank Street Writer (Apple, IBM), Homeword (Apple, IBM), Cut and Paste (Apple), Magic Slate: The Word Processor that Grows With You (Apple), Computers: From Pebbles to Programs

Time for Activity:

Teaching time twenty-five minutes; student work time twenty-five minutes.

Teacher Preparation: Be familiar with one elementary word processing program.

1. Discuss with students how the word processor can aid the writer, scientist, doctor, lawyer, secretary, and student. Explain that with a word processor a student can write text rather than just program or use application programs on a computer. Explain specific terms of the particular word processing program used. For example:

   Cursor
   Text
   Save
   Edit
   Print
   Delete

2. Introduce steps for writing in text.

   a. Get in text mode.
   b. Clear memory so one starts out with "clear slate".
   c. Type in text.

3. Next get students to write a few short sentences in the text mode. For example:

   a. I love computers.
   b. My name is _____.
   c. I am a famous writer.

4. After students have experimented with the word processing program, go over more word processing commands (insert, underline, etc.) in another lesson.

SAMPLE ACTIVITY #13

Grade: 4

Performance Expectation(s): 1.1.2. Read Instructions, Keyboards, and Outputs
1.2.1. Rationalize Information Processing
1.3.1. Interpret Algorithm/Flowchart
1.4.1. Recognize Programming Languages
1.4.2. Operate with Words and Symbols

Prerequisite(s): Students should have been introduced to LOGO.

Material(s): Chalkboard turtle and LOGO compasses.

Software/Materials that could be Incorporated into the Lessons:

Turtle Tricks: An Introduction to Turtle Graphics and Apple LOGO (activity Cards - Apple)

Apple LOGO (Apple)
Dr. Logo (IBM)
PC LOGO (IBM)
TRS-80 Color LOGO (Radio Shack)
LOGO: An Introduction (Barnett)
LOGO Cards: Activities for Apple LOGO (Apple)
LOGO Reference Flip Chart (Apple)
Exploring LOGO Without a Computer

Time for Activity:

Teaching time twenty minutes; student work time 20-25 minutes.

Teacher Preparation: (1) Chalkboard Turtle - cut out cardboard isosceles triangle, 3" at base and 5" high. Glue a magnet on back of the triangle. Draw a turtle on the front with the head of the turtle pointing to the smallest angle. This will indicate the direction the turtle will move, (2) Individual Compasses - have students draw a 3" diameter circle on a 4"x7" index card. Instruct them to mark and label a line at every 45° interval. On the bottom of each card draw a line 3" long and divide the line into equal units of 10, beginning at zero and ending at 100. This line will represent the distance the turtle moves in units of 10 (see example on next page), (3) teacher should prepare several procedures for students to follow.

1. Show students how to use the compass on the chalkboard. Demonstrate the following LOGO commands:

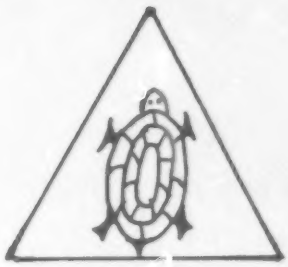
   FD 100 Rt 90 FD 200 Lt 45

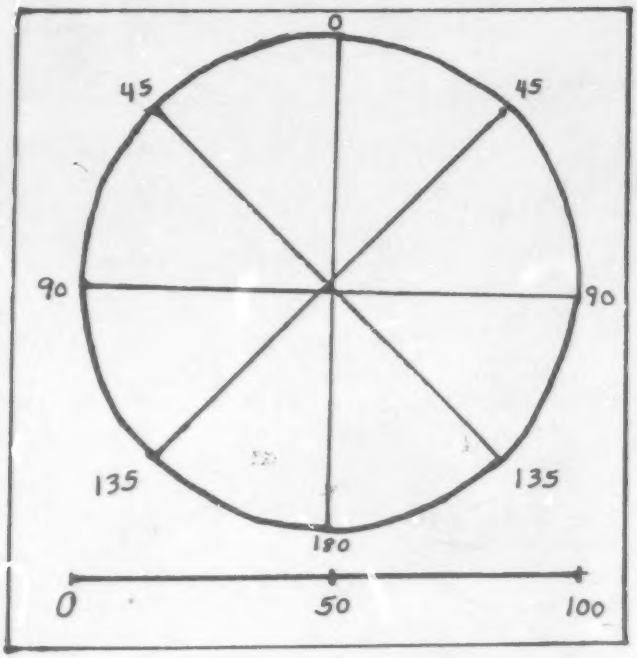
2. Put several commands together such as:

```
FD 100
Rt 90
FD 100
Rt 90
FD 100
Rt 90
FD 100
```

3. As students become more familiar and comfortable using the compass, make the shapes they draw more challenging.

4. This is a good lead-in to using LOGO on the computer





SAMPLE ACTIVITY #14

Grade: 4

Performance Expectation(s): 1.1.1. Recognize Computer Instruction
1.1.2. Read Instructions, Keyboards, and Outputs
1.1.3. Use Control Keys/Commands
1.1.4. Select/Use Written Resources
1.1.5. Experiment as a User

Prerequisite(s):

Students should be familiar with operation of the computer and how to use the keyboard comfortably.

Material(s):

Computer with sufficient memory; Spelling program such as Spelling Strategy by Robert Duts (Apple), and blank disks for storing new lessons.

Software/Materials that could be Incorporated into the Lesson:

Shell Games (Apple), Magic Spells (Apple)

Time for Activity:

Thirty minutes to one hour for first lesson; continued lessons later.

Teacher Preparation:

Teacher should be familiar with the software program and reading the accompanying manual. The teacher should then use the author mode to create a spelling lesson that includes the spelling list for the week. Initialize a disk.

1. Introduce the activity to the class by discussing how the software program is set up. Most software programs contain documentation to aid in this introduction. Review with the students the directions for "authoring" a lesson. A demonstration should be done in front of the class.

2. Allow each student time (later date possibly) to work through the spelling lesson you prepared.

3. Ask a pair of students to gather the spelling lesson for the next week. These students will be expected to follow the directions in the software documentation.

4. Continue these activities with student volunteers preparing lessons for following weeks. Encourage students to use spelling words from other subject areas (language arts, mathematics, science, social studies).

SAMPLE ACTIVITY #15

Grade: 5

Performance Expectation(s): 1.1.3 Use Control Keys and Commands
1.1.5. Experiment as a User
1.1.6. Respond to Error Messages
1.2.1. Rationalize Information Processing

Prerequisite(s):

Students should have been introduced to a simple word processing program.

Material(s):

Word processing program; maze transparency; transparent adhesive tape; AMAZING DATA file.

Software/Materials that could be Incorporated into the Lesson:

Bank Street Writer, Cut & Paste, Homeword

Time for Activity: Class period

Teacher Preparation:

Using a word processing program and a blank disk or cassette, create a screen full of periods. Every character location should contain a period, from the top of the screen to the bottom. Save this file under the name AMAZING. Make a transparency of the maze and use overhead pen to draw a maze with a START and END.

1. Tell students that the computer cursor is a small blinking square on the monitor screen that indicates where the next typed text will appear. Explain that every word processing program has a method of cursor movement that allows the writer to edit or read selected parts of the text.

2. Next show students that some computers have special arrow keys for moving the cursor while others require a combination of keys, often including the CTRL key. The object of the "Amazing Cursor" activity is for students to manipulate the cursor through the maze.

3. Point out the keys needed for cursor movement on your computer. Move the cursor from top to botoom and side to side.

4. Demonstrate how to move the cursor rapidly. Explain that on some programs the REPEAT key is used; on others a two- or three-key combination is used; and on others a particular key is depressed until the cursor reaches the desired location.

5. Load the "Amazing File" and tape the transparency maze to the screen. Make certain the cursor is at the START position of your maze and the periods are directly under the lines of the maze. Tell students to move the cursor through the maze to reach the END position.

6. Schedule timed races to determine who can get through the maze fastest -- both foward and backward.

7. Send a letter to parents explaining your word processing projects for Exploratory Computer Literacy.

8. Design a word processing contract for students. Design lessons 1-10 and have students "sign-off" as they complete the activities assigned.

9. Design a certificate for students as they complete various word processing assignments or projects.

Date, 198

Dear Parent:

Your son/daughter _____ has completed lesson _____ in our word processing unit. This lesson is one segment of our Exploratory Computer Literacy Program in our school. Our goals for computer literacy are as follows:

- The student will feel confident about using computers.
- The student will know how the computer can be used as a tool for problem solving and decision making.
- The student will be aware of, appreciate and understand the functions and impact of computers in daily life.
- The student will recognize the limitations as well as the usefulness of computer technology in advancing human welfare.
- The student will recognize educational and career opportunities related to the specific and general uses of computers.

Three cheers for _____!

Sincerely,

Teacher

I'M A WORD PROCESSING EXPERT!

This is presented to _____ for completing lesson _____ in word processing.

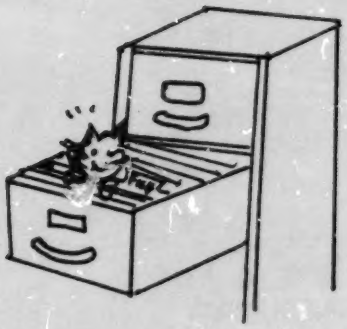
_____
DATE

_____
SIGNATURE

WORD PROCESSING CONTRACT

SAVE FISH

LOAD FISH



GET FISH

DELETE FISH

Name _____

	Date Started	Date Completed
Lesson 1		
Lesson 2		
Lesson 3		
Lesson 4		
Lesson 5		
Lesson 6		
Lesson 7		

POTPOURRI OF WORD PROCESSING APPLICATION IDEAS

Once students gain proficiency as word processors, it is important to keep them motivated by continually offering new applications. Motivation for word processing can be given to the student by offering him/her "real world" opportunities to use these skills. Listed below are a few activities to offer students.

1. Initiate a newsletter for the student's mathematics (social studies, etc.) class.
2. Encourage students to write articles to their school newspaper.
3. Establish a pen pal list for students.
4. Encourage students to do report writing with the word processor.
5. Encourage a business letter writing campaign to a political figure, parents, or special interest group.
6. Set up a creative writing bulletin board.
7. Elicit student help in typing parent flyers regarding school lunches, special events, or units covered in class.
8. Encourage word processing "experts" to tutor their neophyte classmates.

SAMPLE ACTIVITY #16

Grade: 5

Performance Expectation(s): 1.1.1. Recognize Computer Instructions

Prerequisite(s): Some knowledge of BASIC commands

Material(s): Chalkboard and colored chalk (optional)

Software/Materials that could be Incorporated into the Lesson: BASIC for Beginners (Apple); Plotting and Programming Adventures of the Lollipop Dragon; Teaching BASIC Bit by Bit; Memory: The First Step in Problem Solving (IBM)

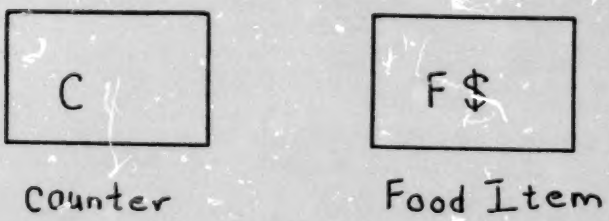
Time for Activity: Class period

Teacher Preparation: Review lesson

Play a game simulating a BASIC program. Draw two large rectangles on the blackboard and label them C (for counter) and F$ (for food item). The question, "What do you want at the market?" is asked to create a shopping list. The answer is given and the values in the rectangles change each time "C=C+1" is called until eight responses have been given.

Convert this to a program in BASIC:

```
10 C=Ø
20 PRINT "WHAT DO YOU WANT AT THE MARKET?"
30 INPUT F$
40 LET C=C+1
50 PRINT C, F$
60 IF C < 8 THEN GOTO 20
70 END
```



SAMPLE ACTIVITY #17

Grade: 6

Performance Expectation(s): 5.1.2. Identify Careers that Involve Computers

Prerequisite(s): None

Material(s):

Career education materials (magazines, newsletters, books), COMPUTER CAREERS (by the editors of Consumer Guide), or a similar text.

Software/Materials that could be Incorporated into the Lesson:

What Can She Be? A Computer Scientist, Computer Careers Handbook, Computers in Your Life

Time for Activity: Class period

Teacher Preparation:

Collect materials. Duplicate the following sheet to hand out. Review a computer careers text.

1. Introduce the lesson by asking students if their parents use computers in their job and how they use them. Have students "brainstorm" a list of different careers that use computers. Write this list on the board or on a bulletin board.

2. Design a follow-up worksheet with matching career positions and job descriptions.

3. Invite a computer person to visit your class and discuss how computers make his/her work more productive.

4. Ask students to take a 5"x8" index card and write a job description. Add this to the bulletin board started in Step 1.

5. Tell students to scan the Sunday Classified Ads for computer related jobs. Add these to your bulletin boards.

6. Design a semester project on the different computer careers. Ask students to do part (or all) of the project on the word processor.

7. "Brainstorm" the different ways that computers can be used in the school system. Ask the principal to list the ways he foresees a computer in the school. Examples: Computer-Assisted Instruction (CAI), school registration, budget, inventory, attendance, library services, computer-managed (CMI), ordering, standardized testing, letters, bulletins, reports, personnel services, guidance and counseling, word processing, data base/recordkeeping, grading, etc.

CAREERS THAT INCLUDE COMPUTERS

Data Entry Operators
Computer Terminal Operators
Computer and Peripheral Equipment Operators
Data Output Equipment Operators
Computer Service Technicians
Programmers
Systems Analysts
Data Communications Specialists
Documentation Specialists
Data Control Clerks
Librarians
Electronic Data Processing (EDP) Managers
Project Leaders
Data Base Administrators
Manufacturer Sales Representatives
Other Computer Sales
EDP Auditors
Computer Security Specialists
EDP Training Specialists
Computer Consultants
Technical Writers
College Professors
Computer Design (Chemists, Physicists, Mathematicians, Engineers, Technicians)
Computer Manufacturers
Word Processing Personnel
Hardware Technicians
Software Writers

WHO HIRES COMPUTER PEOPLE

Government
Service Industries
Manufacturing
Finance Companies
Insurance Companies
Real Estate Companies
Wholesale and Resale Trade Companies
Transportation Companies
Communication
Public Utilities
Agriculture Businesses
Forestry
Fisheries
Mining
Construction

SAMPLE ACTIVITY #18

Grade: 6

Performance Expectation(s): 2.1.2. Create a Program from a Flowchart

Prerequisite(s): Students should have been introduced to flowcharts

Material(s): Flowchart worksheets

Software/Materials that could be Incorporated into the Lessons:

BASIC for Beginners (Apple), Computer Tutor Jr., Teaching BASIC--Bit by Bit

Time for Activity: One class period

Teacher Preparation: Prepare worksheets

1. Introduce students to the various flowchart symbols. Write several steps on the board and ask students to put the steps in the correct order. Next tell them to build a flowchart for the problem.

   a. Turn the water on
   b. Hook up the hose to the faucet connection
   c. Put soap on the sponge
   d. Rinse the car
   e. Buy detergent and sponges

2. Build more problem steps for the following:

   a. Washing your hair
   b. Baking chocolate chip cookies
   c. Doing your science homework
   d. Writing a report for English
   e. Booting the microcomputer
   f. Using an applications software program
   g. Using LOGO

3. Ask the students to build a flowchart for the above problem steps.

4. Design Flowchart Sheets like the following sheet.

FLOWCHART ACTIVITIES

Read the problem steps below. Decide if the problem is a sequence or a repetition. Next decide which type of flowchart you must use.

Problem A: Feeding Your Fish

Get fish food/open container/pour in aquarium

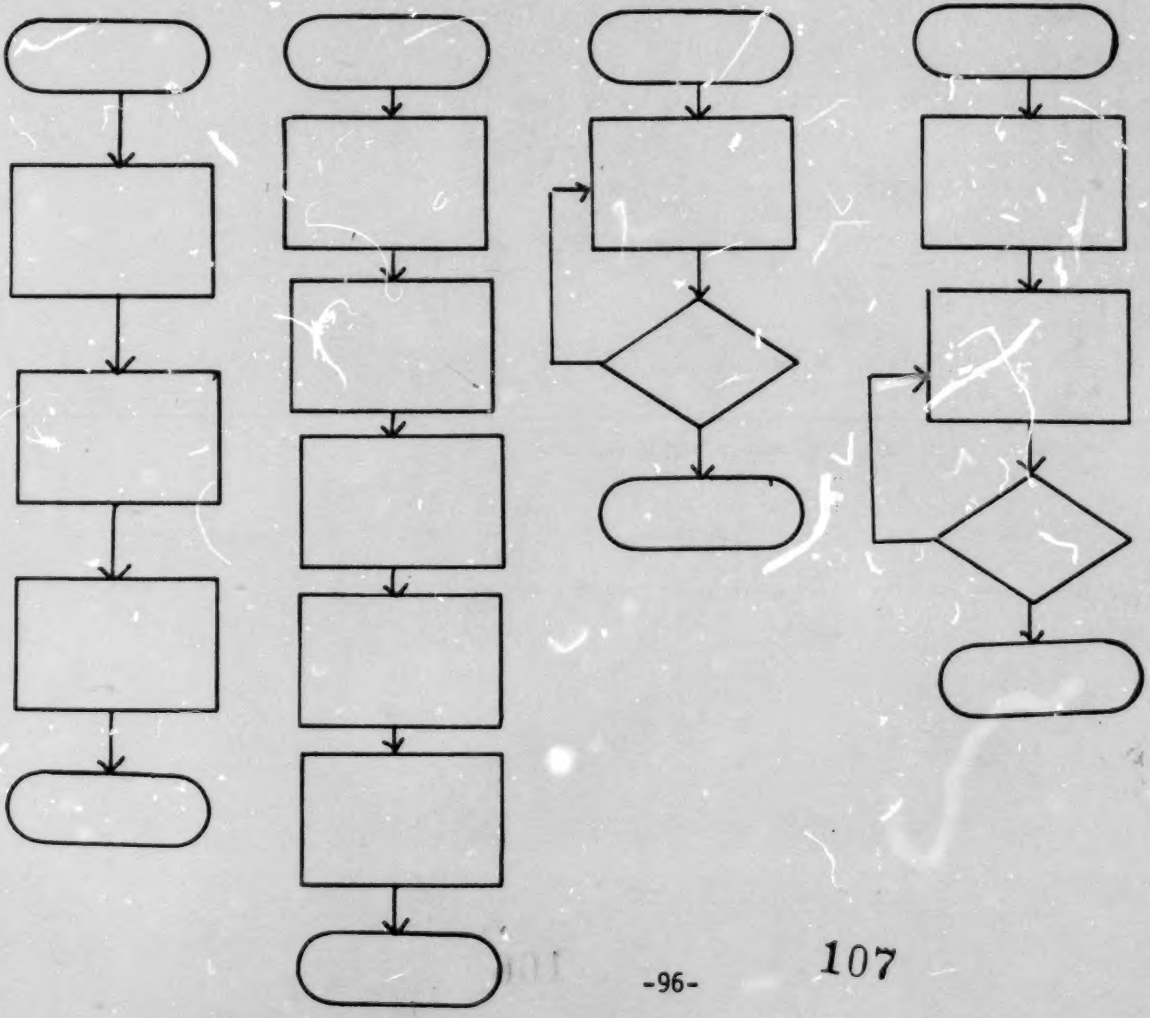
Problem B: Buying a Skateboard

Save money/enough money to buy skateboard?

You must name steps for these last sentences:

Problem C: Styling Your Hair

Problem D: Calling your best friend on the telephone when the line may be busy



REFERENCES

The materials listed below have been referenced in the Suggested Sample Activities Section. The coding preceding the resource item designates that the item is software (SW), printed materials (PM), or audiovisuals (AV).

SW Apple LOGO; LOGO Computer Systems, Inc; Apple

PR Apple LOGO; Maddox & Timko; activity cards

SW Bank Street Writer; Scholastic; Apple, IBM

SW BASIC for Beginners; SVE; Apple

SW Bumble Games; The Learning Co.; Apple

PR Computer Careers Handbook; Connie Winkler

PR Computer Parade; D'Ignazio; Creative Computing

PR Computer Tutor Jr.; Sandra Markle; S&A Products

PR Computers for Kids; Larson; Creative Computing Press (TRS-80)

AV Computers: From Pebbles to Programs

PR Computers in Your Life; Thomas Crowell

SW CyberLOGO Turtle; Cybertronics International, Inc.; IBM

SW Cut & Paste; Electronic Arts, Apple

SW Delta Drawing, Spinnaker Software Corporation; Apple, IBM

PR Don't (or How to Care for Your Computer); A.W. Peller; Box 106, Hawthorne, N.J.

SW Dr. LOGO: Digital Research Inc.; IBM

SW Early Games Music: Counterpoint Software Inc.; Apple, IBM

SW Early Games Piece of Cake; Counterpoint Software Inc.; Apple, IBM

PR Exploring LOGO Activity Cards; K-12 MicroMedia; Apple (cards and sample disk)

PR Exploring LOGO Without a Computer; Addison-Wesley

SW Exploring the PC; IBM demo; IBM

SW E-Z LOGO; MECC; Apple

SW Gertrude's Puzzles; The Learning Co.; Apple

SW Gertrude's Secrets; The Learning Co.; Apple

SW Getting Started with LOGO; MicroMedia Publishers; Apple

SW Facemaker; Muse Software; Apple

SW Homeword; Sierra On-Line; Apple, IBM

SW IBM Education Demo; IBM Corporation; IBM

SW Juggles' Rainbow; The Learning Co.; Apple

PR Katie & the Computer; D'Ignazio; Creative Computing

SW LOGO; IBM Corporation; IBM

SW LOGO; Krell Software Corporation, Apple

PR LOGO: A Problem Solving Approach; Turtle Enterprises

PR LOGO Cards: Activities for Apple LOGO; Scott Foresman & Co.

PR LOGO Discoveries: Margaret Moore; Creative Publications

PR LOGO Lessons: Ideas for the Classroom; MicroMedia

PR LOGO Reference Flip Cart; Scott Foresman & Co.; Apple

PR LOGO Task Cards & Visual Masters; Computer Skill Builders

SW Memory: the First Step in Problem Solving; Sunburst; IBM

SW Magic Slate: The Word Processor that Grows With You; Troll Micro; Apple

SW Magic Spells; MicroEd; Apple

PR My Friend - The Computer; Rice; Denison Publishers

PR 1,2,3...My Computer and Me; Beardon; Apple

SW PC LOGO; IBM Corporation; IBM

SW Rocky's Boots; The Learning Co.; Apple

SW Shell Games; Apple Corporation; Apple

SW Spelling Strategies; Behavioral Engineering; Apple

SW Sticky Bear ABC; Xerox, Apple, IBM

SW Sticky Bear Numbers; Xerox, Apple, IBM

SW Sticky Bear Shapes; Xerox, Apple, IBM

PR Teaching BASIC--Bit By Bit; Friedman & Slesnick

SW The Voice; Muse Software; Apple

SW TRS-80 Color LOGO; Radio Shack Co.; Radio Shack

PR Turtle Tricks: An Introduction to Turtle Graphics & Apple LOGO: Activity Cards

APPENDIX A

EXPLORATORY COMPUTER LITERACY FRAMEWORK

COMPUTER LITERACY FRAMEWORK (EXPLORATORY COMPONENT)

(Note: The K-6 performance expectations are indicated in upper case.)

GOALS: The student will feel confident about using computers.

The student will know how the computer can be used as a tool for problem solving and decision making.

The student will be aware of, appreciate, and understand the functions and impact of computers in daily life.

The student will recognize the limitations as well as the usefulness of computer (science) technology in advancing human welfare.

The student will recognize educational and career opportunities related to the specific and general uses (application) of computers.

I. The student will feel confident about using computers.

A. Demonstrations of confidence implies ability to use the computer.

1. Interact with a prepackaged computer program.

(GRADE 3 EXPECTATION: THE STUDENT RECOGNIZES THAT A COMPUTER NEEDS INSTRUCTIONS TO OPERATE.)

(GRADE 3 EXPECTATION: THE STUDENT READS INSTRUCTIONS, THE KEYBOARD, AND OUTPUT.)

(GRADE 3 EXPECTATION: THE STUDENT USES BASIC CONTROL KEYS AND COMMANDS.)

(GRADE 6 EXPECTATION: THE STUDENT SELECTS AND USES APPROPRIATE RESOURCES (MANUALS) FOR OPERATING THE COMPUTER.)

(GRADE 6 EXPECTATION: THE STUDENT EXPERIMENTS WITH PROGRAMS AS A USER.)

(GRADE 6 EXPECTATION: THE STUDENT TAKES APPROPRIATE ACTION IN RESPONSE TO ERROR MESSAGES IN USING PREPACKAGED PROGRAMS.)

2. Identify the fact that information is processed according to a set of predefined computer rules: organize, coded, given meaning and transmitted.

(GRADE 6 EXPECTATION: THE STUDENT GIVES REASONS FOR PROCESSING INFORMATION.)

(GRADE 6 EXPECTATION: THE STUDENT DETERMINES THE STRUCTURAL COMPONENTS OF INFORMATION PROCESSING, E.G., ORGANIZING, CODING, PROCESSING AND REPORTING.)

(GRADE 6 EXPECTATION: THE STUDENT SEQUENCES THE STEPS REQUIRED IN A PROCESS.)

(GRADE 12 EXPECTATION: THE STUDENT RECOGNIZES THAT COMPUTERS PROCESS INFORMATION BY SEARCHING, SORTING, DELETING, UPDATING, SUMMARIZING, STORING, ETC.)

3. Identify the fact that we communicate with computers through specific symbols and words.

(GRADE 8 EXPECTATION: THE STUDENT RECOGNIZES THAT PROGRAMMING LANGUAGES ARE USED TO GIVE INSTRUCTIONS TO COMPUTERS.)

(GRADE 8 EXPECTATION: THE STUDENT RECOGNIZES WORDS OR SYMBOLS THAT OPERATE THE COMPUTER.)

4. Use computer languages (e.g., BASIC, PASCAL, LOGO, assembler/machine languages.)

   a. Develops good programming style (includes logical structure, documentation readability, efficiency, elegance).

   b. Selects and uses appropriate utility programs.

B. Develop positive attitudes and behaviors toward computers

(GRADE 6 EXPECTATION: THE STUDENT DEMONSTRATES POSITIVE ATTITUDES AND BEHAVIORS TOWARD COMPUTERS IN THE FOLLOWING WAYS:

1) SEEKS WORK OR PLAY WITH COMPUTERS.

2) DESCRIBES PAST EXPERIENCES WITH COMPUTERS WITH POSITIVE-AFFECT WORDS LIKE FUN, EXCITING, CHALLENGING, ETC.)

II. The student will understand how a computer can be used as a tool for problem solving and decision making.

A. Explains what a simple algorithm/flowchart accomplishes, i.e., interpret, generalize, and discuss applications.

(GRADE 8 EXPECTATION: THE STUDENT INTERPRETS, GENERALIZES, AND DISCUSSES APPLICATIONS OF A SIMPLE ALGORITHM/FLOWCHART.)

B. Uses a computation/information system (computer or computer system) to solve simple problems and make decisions.

(GRADE 8 EXPECTATION: THE STUDENT TRANSLATES A SIMPLE ALGORITHM/FLOWCHART INTO A PROGRAM.)

(GRADE 12 EXPECTATION: THE STUDENT DEVELOPS AN ALGORITHM FOR SOLVING A SIMPLE PROBLEM AND/OR TO SOLVE A SET OF SIMILAR PROBLEMS.)

III. The student will be aware of, appreciate, and understand the functions and impact of computers in daily life.

A. Functions are treated at two different levels:

1. Identification of basic operations of computer systems including identification of input, memory, control, arithmetic and output components.

(GRADE 3 EXPECTATION: THE STUDENT IDENTIFIES THE INPUT AND OUTPUT UNITS.)

(GRADE 6 EXPECTATION: THE STUDENT DESCRIBES THE FUNCTIONS OF THE INPUT, OUTPUT, AND CPU COMPONENTS.)

(GRADE 8 EXPECTATION: THE STUDENT DESCRIBES THE FUNCTIONS OF THE INPUT, OUTPUT, CPU, ARITHMETIC, AND MEMORY COMPONENTS.)

(GRADE 8 EXPECTATION: THE STUDENT INVESTIGATES ELECTRONIC COMPONENTS AND THEIR FUNCTIONS.)

2. Recognition and use of the data processing, process control, and information storage and retrieval applications in business and industry, government, education, health and social services, recreation, creative arts, etc.

(GRADE 6 EXPECTATION: THE STUDENT IDENTIFIES COMPUTER APPLICATIONS IN BUSINESS AND INDUSTRY, GOVERNMENT, EDUCATION, HEALTH AND SOCIAL SERVICES, RECREATION, CREATIVE ARTS, ETC.)

B. Impact is treated in relation to how computers affect employment, public surveillance, privacy of individuals, progress and culture, personalization/impersonalization, regulatory and enforcement functions, and daily relationships with people, agencies, organizations, etc.

1. Values efficient information processing.

2. Understands advantages and disadvantages of routine tasks.

3. Appreciates economic benefits of computerization for society.

4. Values increased communication and availability of information made possible through computer use.

(GRADE 6 EXPECTATION: THE STUDENT VALUES INCREASED COMMUNICATION AND AVAILABILITY OF INFORMATION MADE POSSIBLE THROUGH COMPUTER USE.)

5. Understands that computers can be used to effect the distribution and use of economic and political power, in criminal and other antisocial activities, to change society in undesirable ways.

III. The student will be aware of, appreciate, and understand the functions and impact of computers in daily life.

A. Functions are treated at two different levels:

1. Identification of basic operations of computer systems including identification of input, memory, control, arithmetic and output components.

(GRADE 3 EXPECTATION: THE STUDENT IDENTIFIES THE INPUT AND OUTPUT UNITS.)

(GRADE 6 EXPECTATION: THE STUDENT DESCRIBES THE FUNCTIONS OF THE INPUT, OUTPUT, AND CPU COMPONENTS.)

(GRADE 8 EXPECTATION: THE STUDENT DESCRIBES THE FUNCTIONS OF THE INPUT, OUTPUT, CPU, ARITHMETIC, AND MEMORY COMPONENTS.)

(GRADE 8 EXPECTATION: THE STUDENT INVESTIGATES ELECTRONIC COMPONENTS AND THEIR FUNCTIONS.)

2. Recognition and use of the data processing, process control, and information storage and retrieval applications in business and industry, government, education, health and social services, recreation, creative arts, etc.

(GRADE 6 EXPECTATION: THE STUDENT IDENTIFIES COMPUTER APPLICATIONS IN BUSINESS AND INDUSTRY, GOVERNMENT, EDUCATION, HEALTH AND SOCIAL SERVICES, RECREATION, CREATIVE ARTS, ETC.)

B. Impact is treated in relation to how computers affect employment, public surveillance, privacy of individuals, progress and culture, personalization/impersonalization, regulatory and enforcement functions, and daily relationships with people, agencies, organizations, etc.

1. Values efficient information processing.

2. Understands advantages and disadvantages of routine tasks.

3. Appreciates economic benefits of computerization for society.

4. Values increased communication and availability of information made possible through computer use.

(GRADE 6 EXPECTATION: THE STUDENT VALUES INCREASED COMMUNICATION AND AVAILABILITY OF INFORMATION MADE POSSIBLE THROUGH COMPUTER USE.)

5. Understands that computers can be used to effect the distribution and use of economic and political power, in criminal and other antisocial activities, to change society in undesirable ways.

6. Identifies specific applications of computer science and technology in medicine, law enforcement, education, engineering, business, transportation, military, recreation, government, library, creative arts, etc.

C. Understanding that technology differs from science in that the aim of technology involves the means of building and doing useful things while the aim of science is the development of knowledge and understanding.

(GRADE 6 EXPECTATION: THE STUDENT KNOWS HOW ELECTRONIC TECHNOLOGY EVOLVED.)

IV. The student will recognize the limitations as well as the usefulness of computer technology.

A. Recognize disadvantages of computers as tools -- dependency, limitations, costs.

(GRADE 8 EXPECTATION: THE STUDENT LISTS AT LEAST THREE LIMITATIONS OF COMPUTERS.)

B. Identify major applications of computers for information storage and retrieval, simulation and modeling, quality or process control and decision making, computation, data processing.

(GRADE 8 EXPECTATION: THE STUDENT SEQUENCES THE STEPS REQUIRED IN A PROCESS.)

(GRADE 12 EXPECTATION: THE STUDENT RECOGNIZES THAT COMPUTERS PROCESS INFORMATION BY SEARCHING, SORTING, DELETING, UPDATING, SUMMARIZING, STORING, ETC.)

C. Investigate major applications of computers for information storage and retrieval, simulation and modeling, quality or process control and decision making, computation, data processing.

V. The student will recognize educational and career opportunities related to the specific and general (application) of computers.

A. Support services: e.g., data entry, word processing, computer operations personnel, etc.

B. Technical services: e.g., programmer, analyst, data processer, equipment maintenance and repair personnel, etc.

C. Scientific personnel: e.g., computer scientist, electrical engineer, computer engineer, etc.

D. Computer skilled/applications personnel integrated with another category or career.

The following expectations are applicable to V. A-D.

(GRADE 3 EXPECTATION: THE STUDENT IDENTIFIES SUPPORT SERVICE, TECHNICAL AND SCIENTIFIC CAREERS IN THE COMMUNITY AND STATE THAT INVOLVE COMPUTERS.)

(GRADE 6 EXPECTATION: THE STUDENT IDENTIFIES NATIONAL AND INTERNATIONAL CAREERS THAT INVOLVE COMPUTERS.)

(GRADE 8 EXPECTATION: THE STUDENT COMPARES EDUCATIONAL REQUIREMENTS AND OPPORTUNITIES FOR CAREERS THAT INVOLVE COMPUTERS.)

APPENDIX B

GLOSSARY OF ACRONYMS

AI — Artificial Intelligence - It is a branch of computer science dealing with the development of machines capable of carrying out functions normally associated with human intelligence such as learning, reasoning, self-correction, and adaptation.

BASIC — Beginners' All-Purpose Symbolic Instruction Code - This is a language used in most microcomputers.

BIT — Binary digit - The smallest unit of computer information. A single bit can specify either a one or a zero.

CAI — Computer-Assisted Instruction - This is the union of programmed instruction and interactive computer systems capable of providing four types of CAI: drill and practice, problem solving, tutorial and simulation.

CBE — Computer-Based Education - A collective term embracing Computer-Assisted Instruction and Computer-Managed Instruction.

CMI — Computer-Managed Instruction - This is a recordkeeping function of a computer that gives and stores student scores, level of skills, and resources used.

CPU — Central Processing Unit - This is the brain of the computer which controls what the computer does, defined by a sequence of instructions known as a program.

CRT — Cathode Ray Tube - This is a television-like display screen that uses cathode rays to exhibit readable characters or graphic information. It is also known as a monitor.

DOS — Disk Operating System - This is a collection of programs which can facilitate the use of a disk drive.

FORTRAN — Formula Translator - This early high-level language was devised for numerical computations, and although it is somewhat complex and obsolete, it is still one of the most widely used programming languages in scientific environments. Whereas BASIC can be interpreted, FORTRAN requires a compiler.

I/O — Input/Output - Having input and output capabilities.

K — An abbreviation for 1024 bytes...approximately one kilo or 1000.

LISP — List Processing - This is a widely used programming language in artificial intelligence research.

LSI — Large Scale Integration - This refers to the tens of thousands of microscopic electronic circuits that are crowded onto a square measuring less than 1/8 inch on each side.

MODEM — Modulator/Demodulator - This device allows communications between computers over phone lines. It translates the computer's digital signals into audio signals and then back again for the receiving computer. An acoustic coupler sends and receives its signals directly through the mouthpiece and earpiece of the phone, whereas the direct-connect modems send and receive through wire connections to the phone.

PLATO — Programmed Logic for Automated Teaching Operations - This computer-based educational system involves a very large computer with 4000 terminals that can be located anywhere in the world. A unique features of PLATO is that its monitors have a touch sensitive screen that can make responses to a touch made by a finger or a special pen.

RAM — Random Access Memory - The Computer's general purpose memory sometimes called read/write memory. RAM may be written to or read from by the Central Processing Unit. Information on RAM is usually volatile; that is it disappears when power to the computer is turned off.

ROM — Read Only Memory - This is a memory in which integrated circuits are programmed with special systems programs or a simple set of instructions which are stored once, usually by the manufacturer, and cannot be changed. The data can be read from ROM to the CPU but cannot be written into.

APPENDIX C

GLOSSARY OF TERMS

ACOUSTIC COUPLER (acoustically-coupled modem)

A device used for computer communication over a phone line. It is a connecting device that sends and receives computer signal directly through the mouthpiece and earpiece of the phone.

ADDRESS

The physical location of a word in the computer's memory or of a record on a disk.

AI - Artificial Intelligence

A branch of computer science dealing with the development of machines capable of carrying out functions normally associated with human intelligence such as learning, reasoning, self-correction, and adaptation.

ALGORITHM

A step-by-step procedure, often expressed in mathematical terms, for solving a problem or obtaining a particular result.

ALPHA-NUMERIC CHARACTERS

Characters represented either ALPHA-betically, NUMERICally, or using other print characters. For example: A B C D E F 1 2 3 4 5 ? * + -.

APPLICATION

The use of a computer system to accomplish a specific goal.

APPLICATIONS SOFTWARE

Programs designed to instruct the computer to perform real-life tasks (see software).

ARITHMETIC/LOGIC UNIT

This element of the computer performs the basic data manipulations in the central processor. It can perform arithmetic functions and logic operations.

ARRAY

A set of numbers or other entities specifically ordered. The elements of an array can be referred to by their position in the set. These arrays are indicated in many languages by subscripted variables, such as A(X), where X is the subscript.

ARTIFICIAL INTELLIGENCE Abbreviated as AI.

It is a branch of computer science dealing with the development of machines capable of carrying out functions normally associated with human intelligence such as learning, reasoning, self-correction, and adaptation.

ASCII CHARACTERS (pronounced "as key")

A standard binary code using 8 bits to represent 128 character types ($2^8 = 128$). It is an acronym for American Standard Code for Information Interchange. Most small computers and terminal products support only a subset of the full ASCII character definition. This includes upper- and lower-case alphabetic characters, numbers, and a set of special symbols.

ASSEMBLER or ASSEMBLY LANGUAGES

Translator languages that allow instructions to the Central Processing Unit (CPU) to be created without having to be in binary code form (also known as machine languages). These languages use mnemonic names to stand for one or more machine language instructions. An assembly language is a "shorthand" method for avoiding the tedious use of long strings of ones and zeros found in the machine language.

AUTHOR or AUTHORING LANGUAGES

These are high-level languages that allow the user to program without having much knowledge of a computer language. Some author languages (e.g., PILOT) determine programming needs through the user's responses to a series of questions and the provide an appropriate formatted program.

BASIC

An acronym for "Beginners All-Purpose Symbolic Instruction Code." It can be used with almost all microcomputers.

BATCH PROCESSING

This usually refers to the use of punched cards (instead of a computer terminal) to input information and run a program on the computer.

BAUD

The measure of the speed that information can be communicated between two devices. If the data are in the form of alphabetical characters, then 300 baud usually corresponds to about 30 characters per second. It is technically the number of bits transmitted or received per second. Also called baud rate.

BINARY

The binary counting system refers to the number system with a base of two. It also refers to the concept of having only two choices: on and off (or 0 and 1).

BIT

The smallest unit of computer information. It is an acronym for binary digit. A single bit can specify either a one or a zero.

BOOT

An abbreviation for "bootstrap" which is the process of loading the operating system of a computer into main memory and starting its operations.

BREAK

To interrupt a computation or program and return the computer control to a user.

BUG

An error in the computer program. A programming error is called a software bug and a malfunction or design error is called a hardware bug. Debugging is the system of eliminating the program errors.

BUS or BUSS

A set of wires and connections that is used to transfer information between various computer components: central processing unit (CPU), input/output ports, terminals, and interfaces.

BYTE

Usually an eight-bit unit that by various combinations of 0's and 1's represents both text and control characters in computer code. It can represent either an alpha-numeric character or a number in the range of 0 to 255.

CARDS

Printed-circuit boards. Also refers to punched cards.

CARD READER

A device which reads punched/marked cards or forms as an initial step in computer processing.

CASSETTE TAPES

Audio tapes used for storing programs or data for some microcomputers. The cassette system can be compared to a disk system.

CATHODE RAY TUBE (CRT)

A CRT is a television-like display screen that uses cathode rays to exhibit readable characters or graphic information. It is also known as a monitor.

CENTRAL PROCESSING UNIT (CPU)

This is the brain of the computer which controls what the computer does, defined by a sequence of instructions known as a program.

CHIP

A small, flat piece of silicon on which electronic circuits are etched. Usually 1/4" by 1/4" in shape.

COBOL

This is an acronym for Common Business-Oriented Language. It is one of the standard sets of languages most often used on large computer systems. It is geared toward business applications and is beginning to make an appearance on personal computers that have a business orientation.

CODE

A synonym for a computer program: therefore, a programmer generates code.

COMMAND

The request to the computer that is executed as soon as it is received.

COMMUNICATIONS NETWORK

This is formed when several individual computers are connected so that files or messages can be sent back and forth between both large information systems and individual users.

COMPILER

A program that converts one computer language into another, in order to store it for later use. It usually refers to a program that translates a higher-level language into a computer's machine language.

COMPUTER

An electronic device that manipulates symbolic information according to a list of precise (and limited) instructions called a program.

COMPUTER-ASSISTED INSTRUCTION

CAI is the union of programmed instruction and interactive computer systems capable of providing several types of CAI: drill and practice, problem solving, tutorial, and simulation.

COMPUTER LANGUAGE

An artificial language that was designed to allow communication between human beings and computer systems.

COMPUTER LITERACY

This term is usually used to mean the general range of skills and understanding needed to function effectively in a society that is increasingly more dependent on computer and information technology.

COMPUTER-MANAGED INSTRUCTION

Abbreviated as CMI, it is a recordkeeping function of a computer that gives and stores student scores, level of skills, and resources used.

COMPUTER SYSTEM

The computer system is composed of four basic elements:

1. I/O (Input/Output system). Shunts chunks of 0's and 1's.
2. CPU (Central Processing Unit). Adds chunks of 0's and 1's.
3. Memory. Holds groups of 1's and 0's in temporary or permanent form.
4. Control Unit. Mastermind for I/O, CPU, and Memory.

COURSEWARE

Computer programs used for instruction, along with manuals, workbooks and other supporting materials.

CPU

This is the brain of the computer which controls what the computer does, defined by a sequence of instructions known as a program.

CRT

A television-like display screen that uses cathode rays to exhibit readable characters or graphic information. It is also known as a monitor.

CURSOR

The indicator of position, that is seen on a video display screen, which can be moved by various commands such as left, right, up or down.

DATABASE

The large collection of related data that is usually in several files. It is generally accessible by the computer which is commonly said to be on-line.

DEBUG

To find and eliminate errors in a computer program. It is also used in reference to fixing electronic circuitry.

DECK

The collection of punched cards that are used in batch processing.

DIRECTORY

A list of the files stored on a peripheral storage device, like a disk. they are usually obtained through the operating system program.

DISK

A memory device. A flat, circular plate on which digital information can be stored and retrieved magnetically.

DISK DRIVE or MAGNETIC DISK DRIVE

A peripheral device for the storage of programs and other information on either floppy disks or hard disks. Floppy disks are thin flexible plastic tapes with a magnetic recording surface. The floppies are more reliable than the simple audio tapes, but hold less information and operate more slowly than hard disks. Hard disks are made of aluminum and are coated with a magnetic recording surface. On large computer systems, these are the most common form of storage due to the amount of information they can hold, the speed at which they operate, the ease at which the information can be accessed, and their reliability.

DISK OPERATING SYSTEM

Abbreviated as DOS, it is a collection of programs which can facilitate use of a disk drive.

DISTRIBUTED PROCESSING NETWORKS

The connections between a central computer and remote computers where data are transmitted to the central computer (uploading) for complex processing and then sent back to the remote computer (downloading) for review and further processing. This is similar to timesharing in that the distributed processing networks share the cost and time of the expensive central computer.

DOCUMENTATION

The collection of manuals and instructions that explain the proper use and possible applications of a given piece of hardware or software.

DOT-MATRIX PRINTER

A printer that uses a small array of dots to represent a course image of the characters printed. Most dot-matrix printers which print uppercase characters only use a 5 by 7 matrix of dots to represent each character. The printers that are capable of uppercase and lowercase printing usually use a 7 by 9 matrix of dots to represent a full set of alphabetic

characters. The high-resolution dot-matrix devices like the inkjet or precision impact printers which can assemble characters from matrices of 30 by 50 dots that may overlap, are the ultimate in dot-matrix technology.

DOWNTIME

The length of time that a computer or device is not working or is malfunctioning.

DRILL AND PRACTICE

After a student "logs on," the computer presents them with prescribed exercises and records the results. The instructor sometimes can retrieve statistics on student's progress.

DUMB TERMINAL

This is an input/output device that does not use an internal CPU. These require host computers for operation, whereas intelligent terminals have small internal central processing units to handle the terminal's functions and communications.

ELECTROSTATIC PRINTING

In this process, an image is made on a suitable, special-purpose conductive paper by discharging a spark between the printhead electrode and the paper. The spark marks the surface layer of the paper by changing the appearance from a reflective silvery color to the dark color of the underlying layers of the paper.

EXECUTE

To run a program, using the instructions given.

FIRMWARE

The programs that have been wired into the computer by the manufacturer.

FLOATING POINT BASIC

A form of BASIC language that allows the use of decimal numbers. Following calculations, the decimal point "floats" to a new position, as required, giving the term it name.

FLOWCHART

A chart to show the sequence and branching of a particular procedure. This is used frequently in the design of computer programs.

FONT

The set of images associated with a given character set like ASCII, EBCDIC, or the special-purpose sets used in computerized typesetting machines like those used for magazines. A typical font for computer

output from an impact printer might be one which duplicates the font of a standard typewriter. For a low-resolution dot-matrix printer, the font might be a program in the printer's read-only memory which translates each ASCII code into a visual representation as a matrix of dots.

FORTRANS FORmula TRANslator

This early, but still current, high-level language was devised for numerical computations, and although it is somewhat complex and obsolete, it is still one of the most widely used programming languages in scientific environments. Whereas BASIC can be interpreted, FORTRAN requires a compiler.

GRAPHICS

The techniques of creating visual images by using a computer. Black and white or color television display units are used with personal computes. The graphic displays can be used to display the normal letters, numbers and special symbols of a character set, and some personal computers have the ability to draw pictures instead of using words for interactions.

HANDSHAKING

By using this method, two different computer systems (or a computer and a peripheral device) can coordinate communication through some form of interconnection. A key part of this process is the ability to send messages about the status of the communications link, as well as messages that are part of the intended information.

HARDCOPY

The graphic images that are recorded on paper so they are readable by humans, for later reference.

HARDWARE

More properly called computer hardware, it is a collection of physical devices which make up a computer system.

HEXADECIMAL

A number system that uses the base sixteen (2 raised to the fourth power), for its representation of integers. In computers which use byte-sized (8 bit) units of memory, this base provides a more convenient, external, humanly-readable representation of internal data. This base takes two digits from the set of numeric characters 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, and the six letters A, B, C, D, E, F to represent the same number in binary form.

HIGH-LEVEL LANGUAGE

Languages such as FORTRAN, BASIC, COBOL, LOGO, APL, and many others that use English-like commands to keep the user from having to use machine code to communicate with the central processing unit. Typically, one high-level language statement will be equivalent to several machine-level instructions.

IMPACT PRINTING

This method makes a printed image by striking the paper in some way, usually involving a form of ribbon as in a standard typewriter. This method can use the dot-matrix character formation and sometimes use predefined fonts as in the typewriter or on bands or chains of characters contained in some high-speed printers. This method is capable of producing multiple copies at the same time by using carbon paper or something similar.

INITIALIZE

To set up the starting conditions necessary in order to run a program. To prepare a diskette or disk so that the computer can store data on it later.

INPUT

Information entered into the computer.

INPUT DEVICE

A peripheral device that allows the user to enter information into the computer, like a keyboard.

INPUT/OUTPUT DEVICE

Abbreviated as I/O device, they are peripheral devices such as video terminals that have both input and output components. An I/O device consists of channels (wires or telephone lines) within the computer system through which information flows. It also includes all the devices at the ends of wires or phones that originate or receive information. Some common I/O devices are: card readers and punches, paper tape readers and punches, typewriter devices, CRT's, magnetic tape, auxillary disk systems, and line printers.

INTEGRATED CIRCUIT

A very small electronic circuit, that usually consists of a ceramic body 1-5 cm. in length, 1-2 cm. in width, and typically 2 or 3 mm. in thickness, with 4-40 metal leads extending from it.

INTEGER BASIC

A form of BASIC where only whole numbers can be processed (decimal numbers will not work).

INTELLIGENT (DISK, TERMINAL, or OTHER PERIPHERAL)

A component that contains its own CPU so that it can execute instructions without the host's CPU.

INTERFACE

The electronic and physical connection between various electrical and electromechanical devices that allows the different devices to communicate with each other. A serial interface transmits or accepts information one bit at a time, whereas a parallel interface transmits or accepts information one computer word at a time.

INTERPRETER

A computer language translator that translates and executes programs from a high-level language into a machine language, one line at a time.

I/O

Input/Output.

K

An abbreviation for 1024 (2^{10}).

KEYBOARD

A group of buttons on a pad used to input information into a computer system.

KEYPUNCH

A typewriter-like keyboard device that punches holes (which represent data) in cards.

LARGE SCALE INTEGRATION

Abbreviated as LSI, it refers to the tens of thousands of microscopic electronic circuits that are crowded onto a square space measuring less than 1/8 inch on each side.

LISP

This is an acronym for List Processing, which is a widely used programming language in artificial intelligence research.

LISTING

The actual lines of instruction making up a program.

LOAD

The entering of a program into the memory of the computer from some peripheral storage device. It can also refer to the loading of a register when a few bytes are transferred from the main memory into the registers of the central processor in an assembly language program.

LOGO

The name for this program was coined by Wallace Feurzeig at Bolt Beranek and Newman, Inc., and is derived from the Greek word for "word" or "thought".

LSI

Refers to the tens of thousands of microscopic electronic circuits that are crowded onto a square space measuring less than 1/8 inch on each side.

MACHINE LANGUAGE

The language that a specific machine was built to understand, written as a sequence of numbers. This language is immediately obeyed by the hardware, but is usually rather inconvenient to use.

MACHINE READABLE

Information is stored on a peripheral storage device so that it can be recorded or played back to the computer.

MAGNETIC TAPE DRIVE

This is also called a tape transport, tape unit or tape deck, that has a reel of magnetic tape mounted to it for access under program control. The tape is used as both a form of memory and for I/O. It can be stored conveniently away from the machine when it is put on a tape drive attached to the computer.

MAIN MEMORY

A random access form of memory that is the primary resource for storage of data and programs in a computer. Main memory is a temporary stage space in contemporary personal computers, and when the power is shut off, the information is lost.

MARK SENSE CARD READER

This is an input device that can read cards which have information marked by graphite pencil.

MASS STORAGE

This technique keeps track of large amounts of permanently available data in a machine-readable form. It is slower in access than main memory, but yields larger potential amounts of data and permanent qualities. Mass storage is provided by cassette tapes or floppy disks in most small personal computers.

MEMORY

This is also called main memory, core memory, or main storage. The memory is the integrated circuits of a computer on which the information can be stored. This is directly accessible to the CPU. See random access memory (RAM) and read only memory (ROM).

MENU

The list of files and programs on a disk or tape.

MICROCOMPUTER

It appeared around 1972 and is a very small computer with small peripherals. The main differences between the microcomputer and its predecessor the minicomputer, are between their power, size and cost. The microcomputer has a central processing unit that is a microprocessor.

MINICOMPUTER

This is a small low-cost computer with its peripherals and system software that can be used either as a batch terminal in association with a large computer or as an independent machine. These appeared around 1965, and were physically smaller than their predecessors, the mainframe computers.

MODEM

An abbreviation for modulator/demodulator, it allows communication between computers over phone lines. It translates the computer's digital signals into audio signals and then back again for the receiving computer. An acoustic coupler sends and receives its signals directly through the mouthpiece and earpiece of the phone, whereas the direct-connect modems send and receive through wire connections to the phone.

MODULATOR

An electronic black box that is used to translate the television output signals of the computer into a standard radio frequency television signal which can then be fed into the antenna terminals of a television tuned to the appropriate channel. Usually on R.F. (radio frequency modulator).

MONITOR see cathod ray tube (CRT).

MOTHERBOARD

A printed circuit board that has slots for various other circuit boards to be plugged into.

NETWORKING

The sharing of resources or the communication between two computers. See resource sharing networks, communications networks, and distributed processing networks.

NUMERIC PAD

A keyboard for numeric input into a computer.

OBJECT CODE

The machine language form of a program is also called the object code of the program, and can be directly loaded into memory and executed since it has already been translated from it humanly readable form to the internal executable form.

OCTAL

The base eight number system, with the digits 0, 1, 2, 3, 4, 5, 6, 7. Many programmers prefer octal to hexadecimal notation, even though octal is a natural notation of numbers only on machines whose "word size" is a multiple of 3 bits.

ON-LINE

A term which usually refers to the location and connection of devices so that they are immediately accessible to the CPU of a computer. It also commonly refers to information that is directly obtained through a computer as opposed to a book, television, etc.

OPERATING SYSTEM

The systems software (usually created by the manufacturer) that manages the computer and its peripheral devices. This allows the user to run programs and to control the movement of information to and from the computer memory and peripheral devices. See software. Several machine independent operating systems of personal computers also exist that can be run on many different computers. These include the Microsoft forms of BASIC, a very traditional, large, computer-like operating system called CP/M, and the interactive, Pascal language operating system called UCSD Pascal.

OPERATOR

A symbol in a programming language that represents an operation to be performed on one or more operands. For example, "+"(add), or "*"(multiply). Also the person who runs the computer.

OPTICAL SCANNER

An I/O device that reads clearly typed or printed information.

OUTPUT

the information reported by the CPU to any peripheral device. It is generally any data that leave the computer.

PARALLEL INTERFACE

This method plugs a peripheral device into a computer so that whole bytes (or groups of bytes) of data are transferred at one time. Multiple wires are therefore typically found in parallel interfaces. The parallel interface in a printer might include seven or eight data wires from three or five control wires. At the price of a more expensive connector, a much higher data transmission rate results.

PASCAL

This compiled computer language is personal computing's answer to the elaborate, conventional languages of COBOL, Algol and PL/I that are found on larger systems. It was invented by computer scientist Niklaus Wirth (circa 1970) and was initially intended as an aid to teaching computer languages. It now has widespread use in computers of every size, from Apple II computers to the world's largest and fastest supercomputer, the Cray-1. Pascal is the language selected for the first computer science Advanced Placement (AP) exam.

PASSWORD

This safety device is essential in order to protect the privacy of a terminal user's programs. Password usage prevents interference by unauthorized terminal users, either accidental or deliberate.

PEEK

An instruction in BASIC that enables the programmer to look at (peek at) any location in programmable memory. It is often used to scan the memory locations which hold the information displayed on the video monitor in order to determine what is being displayed.

PERIPHERAL DEVICES

Devices that can send or receive data to and from a computer. They communicate with the central processing unit and store data in accessible form by use of keyboards, printers, disk drive, music synthesizers, etc.

PILOT

A high level language designed to make it easier for instructors to design software.

PINFEED

This is a standard feature of many computer printers that use paper with holes along both edges in order to keep multiple page printouts in correct alignment.

PIXEL

The smallest available unit of output in a graphics display device that can be controlled by the computer. In a dot matrix printer, the pixel is one dot within the matrix. On a television display device, the pixel is one dot on the screen of the television. Pixels can be black, white or colored, depending on the type of screen used.

PLATO

Plato is an acronyum for Programmed Logic for Automated Teaching Operations. This computer-based educational system originated at the University of Illinois in 1959. The system involves a very large computer with 4000 student terminals that can be located anywhere in the world, with each terminal consisting of a key set and a plasma display device. The plasma display device is made up of two sheets of glass surrounding the plasma layer. When the gas is electronically excited, it lights up certain portions of the glass, forming words, pictures, graphics, etc. The glass is treated so that people can touch the screen to make responses with their fingers or a special pen.

POKE

This instruction in BASIC is used to place a value (poke) into any location in programmable memory and is often used in conjunction with PEEK.

PORT

The section of a computer through which that the peripheral devices can communicate.

PRINTER

An output device that prints the characters on paper. A KSR or Keyboard Send/Receive option can input as well as output data and converts the printer into a terminal. The RO or Receive Only printer is more common and cannot send data.

PROGRAM

The list of instructions that tells a computer to perform a given task or tasks.

PROGRAMMER

A person who designs and writes a set of instructions for the computer.

PROGRAMMING

Programming is the designing, writing, inputting and testing of a computer program.

PROGRAMMING LANGUAGE see computer language

PROTOCOL

A set of procedures or conventions used routinely between equipment such as terminals and computers.

QUEUE

A queue is a waiting line within the computer for use of a certain component. These occur most often in a time-sharing or resource-sharing system where several users need to use the same device.

RANDOM ACCESS MEMORY

The computer's general purpose memory that is sometimes called read/write memory. RAM may be written to or read from by the Central Processing Unit. Information on RAM is usually volatile; that is, it disappears when power to the computer is turned off.

RAM

The computer's general purpose memory that is sometimes called read/write memory. RAM may be written to or read from by the Central Processing Unit. Information on RAM is usually volatile; that is, it disappears when power to the computer is turned off.

READ ONLY MEMORY

Abbreviated as ROM, it is a memory in which integrated circuits are programmed with special systems programs or a simple set of instructions which are stored once, usually by the manufacturer, and cannot be changed. The data can be read from ROM to the CPU but cannot be written into.

RELIABILITY

The measure of frequency of failure of the computer and other hardware.

REMOTE ACCESS

Terminals that are physically away from the central computer system (e.g., across town, or across campus) at "remote stations".

RESPONSE TIME

The time interval between the request for a job to be done and when the user receives the results. This is also called turnaround time.

RS-232 INTERFACE

A data communications industry standard for the serial transmission of data to a peripheral device, such as a printer, a video monitor, a plotter, etc.

RUN

The continuous performance of the list of instructions in a given program or procedure. It is also the command to run a program (RUN). When a computer is executing a program, we say it is being run.

SAVE

To store a program on a peripheral storage device for later use. It is also a command.

SCROLLING

The movement of lines on a video display, vertically in such a way that the top line disappears and a new bottom line comes into view at the bottom of the screen.

SERIAL INTERFACE

This interface between a computer and a peripheral device can be done over as few as 3 wires. It is usually slower than the equivalent parallel-communications interface since each of the eight bits of a byte must be funneled through one wire in each direction. See interface.

SIMULATIONS

Games and representations of real life situations. Simulations are feasible when real life equipment is too expensive or complex (e.g., cyclotron, nuclear reactor); measurement is impossible or disturbs the system (velocity of a falling body); experimental technique required is too complex (e.g., political promotion, science lab techniques); time scale is too long range (genetic studies, population dynamics, economic or social predictions); real life situation is too dangerous (radiation from atomic reaction, explosive or toxic substances); and finally, when a problem requires extensive data collection and/or bookkeeping.

SOFTWARE

Computer programs that consist of a list of instructions that tell a computer to perform a given task or tasks. There are two basic types of software. Systems software enables the computer to carry out its basic operations. Examples include operating systems, language interpreters, or utility programs. Applications software consists of programs that instruct the computer to perform various real-world tasks such as writing checks, playing chess, or testing students.

SOURCE PROGRAM

When a program is written by a human being, its source program is the humanly readable form seen on the terminal. The source program gets edited, changed and updated in the process of creating a program. The translator program operates on the source language to produce the object code of the machine language.

STATEMENT

The single meaningful expression or instruction in a high-level language such as FORTRAN, APL, or COBOL.

STORAGE

This is also known as memory. Some typical forms of storing data for a later time are: magnetic disks, which are flat spinning disks with magnetizable surfaces; magnetic drums, which hold more than 11 million bytes and take about 2.5 milliseconds to retrieve; and punched cards, which hold 80 letters or numbers.

STRING

A group of characters stored by their numeric codes that are used in high-level languages such as BASIC.

TAPE DRIVE

A peripheral device for the storage of programs and other information onto magnetic tape.

TAPES

An inexpensive mass storage medium which is convenient for large files or archival storage. Data is retrieved sequentially rather than randomly on tape medium.

TELECOMMUNICATIONS

This is the art and practice of sending computer (or verbal) messages through the telephone network or via radio. In the field of personal computing, it refers to the use of serial communications techniques and modems that allow messages to be sent via telephone to other personal computers or to centralized information services.

TERMINAL

An input/output device that is intended for the user to interact directly with the machine. It consists of a keyboard through which the user can send information to the computer, and a printer or display device through which the computer can present information to the the user.

THERMAL PRINTING

A method of scanning special heat-sensitive paper by moving a printhead which contains a dot matrix of electronically controllable heated areas. The heated zones are turned on if a dot image is to be recorded as part of the dot matrix representation of a character during the paper scan.

TIMESHARING

A system where many users of a central processing unit obtain services for short intervals of time. This allows each user to run a program while others are also using the system. The connections are made through direct wires or modems and telephone wires.

TOUCH PANEL

A device that is sensitive to touch attached to the front of the terminal display screen. It is used to input information at a particular screen location.

TURTLE

A graphic representation of a computer-based robot that can be moved around the computer screen with commands such as FORWARD, BACK, RIGHT, etc.

TURTLE GEOMETRY

A new mathematics based on turtle movement that emphasizes transformations in local space rather than relationships to a fixed global reference point.

TUTORIAL

CAI program which provides actual instruction instead of the teacher. The computer "tells and asks" the student facts and questions and the teacher takes on the role of consultant or resource person.

UPLOAD see distributed processing networks.

UTILITY PROGRAMS

The systems software that allows the computer to perform certain basic functions like copying the contents of one disk onto another.

VARIABLE

A variable in a computer language can be thought of as a memory location into which a character or a number may be stored. It usually has a symbolic name which is created by the person writing the program.

VIDEO TERMINAL

A terminal that uses a video display unit like a monitor or CRT as its output device. See cathod ray tube.

VOLATILE

Information that disappears from the memory of the computer when the power is turned off.

WORD

A computer word can vary from 8-65 bits, but most personal computer manufacturers generally use an 8-bit word. In the example 8-bit word, the 8 represents the number of bits processed and addressed at one time by the central processor.

RECOMMENDED SOFTWARE

Apple LOGO; LOGO Computer Systems, Inc.; Apple

Arithmetic Skills; Eduware; Apple

Astheometry Vol. 1; MECC; Apple

Bank Street Writer; Broderbund Software; Apple, IBM

Coloring Series II; Koalaware; Apple (requires Koala Pad)

Cut & Paste; Electronic Arts; Apple

CyberLOGO; Cybertronics; Apple

Decimals; Eduware; Apple

Early Games Fraction Factory; Counterpoint Software, Inc.

Early Games Match Maker; Counterpoint Software, Inc.; Apple, IBM

Early Games Music; Counterpoint Software, Inc., Apple, IBM

Early Games Piece of Cake; Counterpoint Software, Inc.; Apple, IBM

Elementary Math Vol. 1; MECC; Apple

Elementary Science/Math; EISI; Apple

Elementary Social Studies Vol. 2; MECC; Apple

Elementary Vol. 7 - Preready & County; MECC; Apple

Exploring the PC; IBM Corporation; IBM

E-Z LOGO; MECC; Apple

Facemaker; Spinnaker; Apple, IBM

Homeward; Sierra On-Line; Apple, IBM

Hot Dog Stand; Survival Math Skills; Sunburst; Apple, IBM, TRS-80

IBM Education Demo; IBM Corporation, IBM

IBM PC LOGO; IBM Corporation, IBM

Know Your Apple; Muse Software; Apple

Krell LOGO; Krell Software Corporation; Apple

Letter Man; Behavioral Engineering; Apple, IBM

Magic slate: The Word Processor that Grows With You; Troll Micro; Apple

Math Gallery; Behavioral Engineering; Apple

Math Strategy; Behavioral Engineering; Apple

Memory Match; Troll Microcomputers; Apple

Memory: The First Step in Problem Solving; Sunburst; IBM

MicroDivision; Hayden Software; Apple

Micro Multiplication; Hayden Software; Apple

Money! Money!; Opportunities for Learning; Apple

Moptown Parade; The Learning Company, Apple

Quizagon; Counterpoint; Apple, IBM

Robot Probe: An Intro to Programming; EISI; TRS-80

Rockies Boots; The Learning Company; Apple

Snooper Troops; Spinnaker; Apple, IBM

Spelling Gallery; Behavioral Engineering; Apple

Spelling Strategy; Behavioral Engineering; Apple

Sticky Bear ABC; Xerox; Apple, IBM

Sticky Bear Numbers; Xerox; Apple, IBM

Sticky Bear Opposites; Xerox; Apple, IBM

Sticky Bear Scrapes; Xerox, Apple, IBM

Story Tree; Scholastic; Apple

Thinking Skills; EISI; TRS-80

TRS-80 Color LOGO; Radio Shack; Radio Shack

Typing Strategy; Behavioral Engineering; Apple

Using a Calendar; Opportunities for Learning; Apple

RECOMMENDED PERIODICALS

EDUCATIONAL PERIODICALS:

ACM SIGCUE Bulletin; Association for Computing Machinery; P.O. Box 12015, Church Street Station, NY 10249

AEDS Journal and AEDS Monitor; Association for Educational Data Systems; 1201 Sixteenth St., NW, Washington, DC 20036

Classroom Computing Learning; Classroom Computer News; 5615 West Carmel Road, Cicero, IL 61650

Computer Education; Mrs. P. Jackson, The Computer Education Group; North Staffordshire, Polytechnic Computer Center, Blackheath Lane, Stafford, England

Courseware Quarterly; Academic Computer Association; P.O. Box 27561, Phoenix, AZ 85061

EDU; Educational Products Group, Digital Equipment Corporation, ML5-2/M40, Maynard, MA 01754

Educational Computer Magazine; P.O. Box 535, Cupertino, CA 95015

Educational Technology; 140 Sylvan Avenue, Engelwood Cliffs, NJ 07632

Electronic Education Eight, Electronic Communications, Inc., 1311 Executive Center Drive, Tallahassee, FL 32301

Electronic Learning; Scholastic, Inc., 901 Sylvan Avenue, Englewood Cliffs, NJ 07632

Instructional Innovator; AECT; 1126 Sixteenth Street, NW, Washington, D.C. 20036

Interface: The Computer Education Quarterly; Stephen Mitchell, ed.; 915 River Street, Santa Cruz, CA 95060

Journal of Computer-Based Instruction; ADCIS; 409 Miller Hall, Western Washington University, Bellingham, WA 98225

Journal of Computers in Mathematics & Science Teaching; P.O. Box 4455, Austin TX 78765

Journal of Educational Technology Systems; Baywood Publishing Company, Inc., 120 Marine Street, Box D, Farmingdale, NY 11735

Microcomputers in Education; QUEUE, 5 Chapel Hill Drive, Fairfield, CT 06432

Recreational Computing; P.O. Box E, 1263 El Camino Real, Menlo Park, CA 94025

The Computing Teacher; International Council for Computers in Education, Department Computer and Information Science, University of Oregon, Eugene, OR 97403

Teaching and Computers; P.O. Box 644, Lyndhurst, NJ 07071

The Computing Teacher; 135 Education, University of Oregon, Eugene, OR 97403

The Journal; P.O. Box 992, Action, MA 01720

TRS-80 Microcomputing News; Tandy Corporation, Fort Worth, TX 76102

PERIODICALS:

A+, Ziff Davis Publishing, One Park Avenue, New York, NY 10016

BYTE; 70 Main Street, Peterborough, NH 03458

Compute; Small Systems Services, Inc., Greensboro, NC 27403

ComputerTown, USA!; People's Computer Company, P.O. Box E, Menlo Park, CA 94025

Creative Computing; Elizabeth Styles, ed., P.O. Box 789-M, Morristown, NJ 07960

CURSOR; P.O. Box 550, Goleta, CA 93017

Family Computing; Scholastic, Inc., 730 Broadway, New York, NY 10003

InfoWorld; 530 Lytton Avenue, Palo Alto, CA 94301

Microcomputing; 80 Pine Street, Peterborough, NH 03458

Nibble (Apple); P.O. Box 325, Lincoln, MA 01773

PC World; Subscription Department, P.O. Box 6700, Bergenfield, NJ 07621

Personal Computing; P.O. Box 1408, Riverton, NJ 08077

On Computing; P.O. Box 307, Martinsville, NJ 08836

Popular Computing; Byte Publications, Inc., P.O. Box 307, Martinsville, NJ 08836

Purser's Magazine; P.O. Box 446, El Dorado, CA 95623

SIGCUE Bulletin; ACM, Inc., P.O. Box 12115, Church St. Station, NY 10249

SoftSide; P.O. Box 68, Milford, NH 03055

Softtalk (for IBM, Apple); 7250 Laurel Canyon Blvd., North Hollywood, CA 91605

Softline; P.O. Box 60, North Hollywood, CA 91603

Source World; Source Telecomputing Corporation, 1516 Anderson Road, McLean, VA 22102

St. MAC; Softtalk Publishing, Inc.; 7250 Laurel Canyon Blvd., North Hollywood, CA 91605

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A Dictionary of Computer Words. Robert Bly. Banbury Books, Inc. 1983.

A First Course in Computing. Arthur Luehrmann, Herbert Peckham, and Martha Ramirez. McGraw-Hill. 1982.

A Practical Guide to Computers in Education. Peter Coburn, Peter Kelman, Nancy Roberts, Thomas Snyder, Daniel Watt, and Cheryl Weiner. Addison-Wesley. 1982.

Are You Computer Literate?. Karen Billings and David Moursund. Dilithium Press. 1979.

Basic Computer Games and More Basic Computer Game. David Ahl. Creative Computing Press 1976. 1977.

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Computer Crime. August Benquai. 1978.

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Computer Power: A First Course in Using the Computer. Make Moshell et al. McGraw-Hill, Gregg Division. 1982.

Computer Power and Human Reason. J. Weizenbaum. W.H. Freeman. 1976.

Computeronics Problem Solving with Computers, 1978. Leon County Public Schools, 2757 West Pensacola Street, Tallahassee, FL 32304.

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Computer Rage. Creative Computing Press. 1980.

Computers and Privacy. Biological Sciences Curriculum Study. 1980.

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Computers for Kids. Sally G. Larsen. Creative Computing Press. 1981.

Computers in Education. James L. Poirot. Swift Publishing Company. 1980.

Computers in Mathematics: A Sourcebook of Ideas. David Ahl, ed. Creative Computing Press. 1979.

Computers in Society. Donald Sanders. McGraw-Hill. 1981.

Computers in Teaching Mathematics. John Burton, Peter Coburn, and Frank Watson. Addison-Wesley. 1982.

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TEACHER INPUT FORM
(Exploratory Computer Literacy Curriculum Guide, Grades K-6)

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(Fill in)		(Check one for each section)		
Name of Section	Page(s) of Sec.	Add to Section	Delete from Section	Modify the Section
a.				
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2. My recommendations are to do the following:

3. I am enclosing materials/activities/resources that I have found useful in my classroom and that may be of interest to others if included in the resource section of the guide.

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